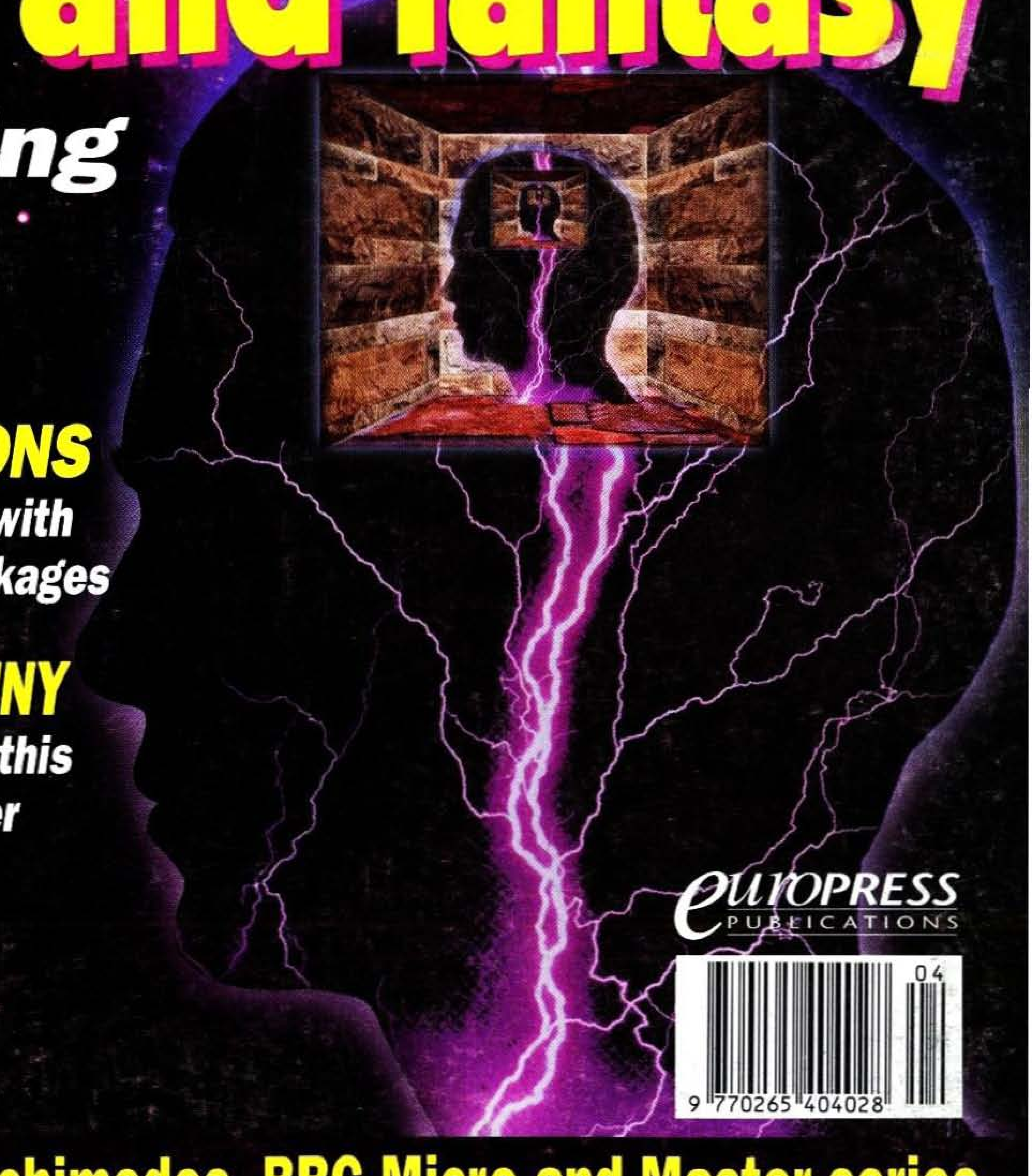
THE MICRO USER

INSIDE
Essential Archimedes
Packed full of hints and tips

Volume 10 Number 2 April 1992 £1.95

Fact and fantasy

Exploring virtual reality



PRESENTATIONS

Making your mark with three graphics packages

BALLS OF DESTINY

Type-in delights in this great arcade teaser

europress PUBLICATIONS

THE COMPLETE SOLUTION FOR ALL ACORN USERS

BBC A3000, Archimedes BBC Micro and Master series

REMOVABLE, PORTABLE, EXPANDABLE AND SECURE

44 MEGABYTE
MORLEY

SOUNDS TOO GOOD to be true. Morley Electronics new removable cartridge hard disc systems can work on the A3000 through to the A540 (including the new A5000) as well as on BBC Master computers.

THE SECRET LIES in the hard disc cartridge which after dismounting can be taken out and stored, or be replaced by another cartridge within a few seconds. Security is so easy with these discs because you can simply take them home or lock them away.

THE UNIT can also be used as a backup system for internal hard drives as well. Once you have looked at the prices you will see that they are significantly cheaper than tape streamer sytems. Because they are a hard disc you also have virtually instant access to the information stored on them and as it is simply a matter of copying files from one disc to another instead of having to run lengthy restore programs to recover information from tape.

PERHAPS THE BIGGEST advantage of these units is that when one cartridge is full then all you have to do is purchase a new cartridge and not a whole mechanism saving you a small fortune in the process. The mechanisms can be either 44MB or 90MB, however please note that the cartridges are not interchangeable between the two.

THE MECHANISMS are true SCSI devices. Therefore, the interface card we can supply with the drives can have up to seven* devices attached such as CD-ROM drives, standard hard discs, flatbed scanners, tape streamers, etc. giving you maximum expandability for the future.

Specifications

- § ***20 Millisecond Access***
- § ***Data transfer up to 1.25MB/s***
- § ***Reliability of 30,000 hours MTBF***
- § ***8K Buffer***

A3000, **300, 400, 5000, 540 & Master

44MB Inc Interface Card	*£575.00*
90MB Inc Interface Card	*£775.00*
44MB Excl Interface Card	*£499.00*
90MB Excl Interface Card	*£699.00*
44 MB Cartridge	*£69.00*
90 MB Cartridge	*£109.00*

Please state computer type when ordering.
Prices exclude VAT and carriage.

Prices include mechanism, case, one cartridge, all necesary cables and software.
Prices excluding interface card do not include software.

** Master can only have one device attached.*
*** Please note that the 300 series machines require a MEMC1A upgrade and a backplane to be fitted, both available from Morley. Please call for prices.*

MORLEY
E·L·E·C·T·R·O·N·I·C·S · L·T·D

Control Software

SPARKLE is a RISC OS compliant control package for the A3000 and Archimedes allowing full control of input, output and motor devices via most control boxes. Effectively Sparkle introduces the user to the world of control through a simple language which gives full access to control boxes as well as the ability to carry out data and frequency logging via analogue equipment. Inputs and outputs are simulated on screen and the package includes full counting and timing facilities. Numerous exmples are included as are various exercises. Sparkle can control Deltronics, Phobox and Andi-Oddule control boxes as well as being the LEGO® dacta recommended control software for their Interface A control box. Please state control box when ordering.

Sparkle	£59.00
Sparkle for LEGO®	£59.00
Sparkle Site Licence	£200.00
LEGO® dacta Interface A Control Box	£120.00

Coming Soon...
The Octopus

Analogue & User Interface

FULL SPECIFICATION BBC analogue & user port for the A3000. The analogue port is accessable using ADVAL from BASIC 5 with all BBC OSbyte calls supported. *As supplied to Acorn Computers for their special access A3000.*

Analogue & User Port	£59.00

SCSI Hard Disc Drives

MORLEY HARD DISC DRIVES and interfaces are now renowned throughout the Acorn community. A combination of the ***fastest and most compatible interface*** available, together with high quality drive mechanisms means you can be confident that you are making an investment for the future.

THE INTERFACE CARD is ***fully Acorn compatible and is the only ANSI level 1 & 2 compliant*** card on the market. It works with amongst others Fujitsu, Rodime, Quantum, Miniscribe and Connor hard disc drives as well as Wangtek tape streamers, Morley's own removable hard discs, Computer Concepts Scanlight Professional and is ***guaranteed to work with any ANSI compliant SCSI device.*** The card can give sustained data transfer rates of up to 4MB per/s. It is also fully compatible with RISC-OS 2 & 3 and fits the A3000, 300, 400, 540 and the new A5000 so when you upgrade machines you can hang on to your hard disc without any problems. If you already have a hard disc inside your computer but would like to have the benefits of a SCSI drive,our card lives quite happily alongside an existing ST506.

A3000 Fixed Hard Discs	
52MB	*£379.00*
100MB	*£499.00*

A300, A400 & A5000 Fixed Hard Discs*	
52MB	*£299.00*
100MB	*£449.00*

Other SCSI devices

150MB tape streamer	*£799.00*

All prices include standard interface card, all necessary software, cables and cases. For cached interface card please add £50.00

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WE ARE an authorised Acorn dealer, Education dealer and service centre and have been making peripheral devices for Acorn computers since 1985. We are the only dealer in the North East with dedicated Acorn demonstration facilities. We are also registered dealers for Star and Citizen printers. This advert only carries prices for our own products so please call if you wish to receive prices for equipment which is not advertised.

Memory Upgrades

MORLEY MEMORY expansion boards for the A3000 are high quality four layer boards and unlike most other cards can be expanded at a later date for maximum flexibility.

A3000 1MB Non-Exp	£59.00
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THE MORLEY TELETEXT ADAPTER. Buy the product that launched a company. A legend in its own lifetime etc. etc.

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Archimedes	£125.00
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*BBC to Arc. upgrade	£35.00

*(Adapter needs to be sent to Morley)

Hardware

WE ALSO SUPPLY the full range of Acorn computers from the A3000 to the 540. Please phone for competitive prices. We are also happy to quote for *customised* versions or quantities of Acorn computers. If you have a question about any of our products especially concerning compatability with your existing equipment, please feel free to call us and we will do our best to answer it for you.

Education & Dealer Enquiries Welcome. Please note all prices exclude VAT and Carriage.

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THE MICRO USER

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The Micro User welcomes new program listings and articles for publication. All material should be supplied on disc or tape and printed. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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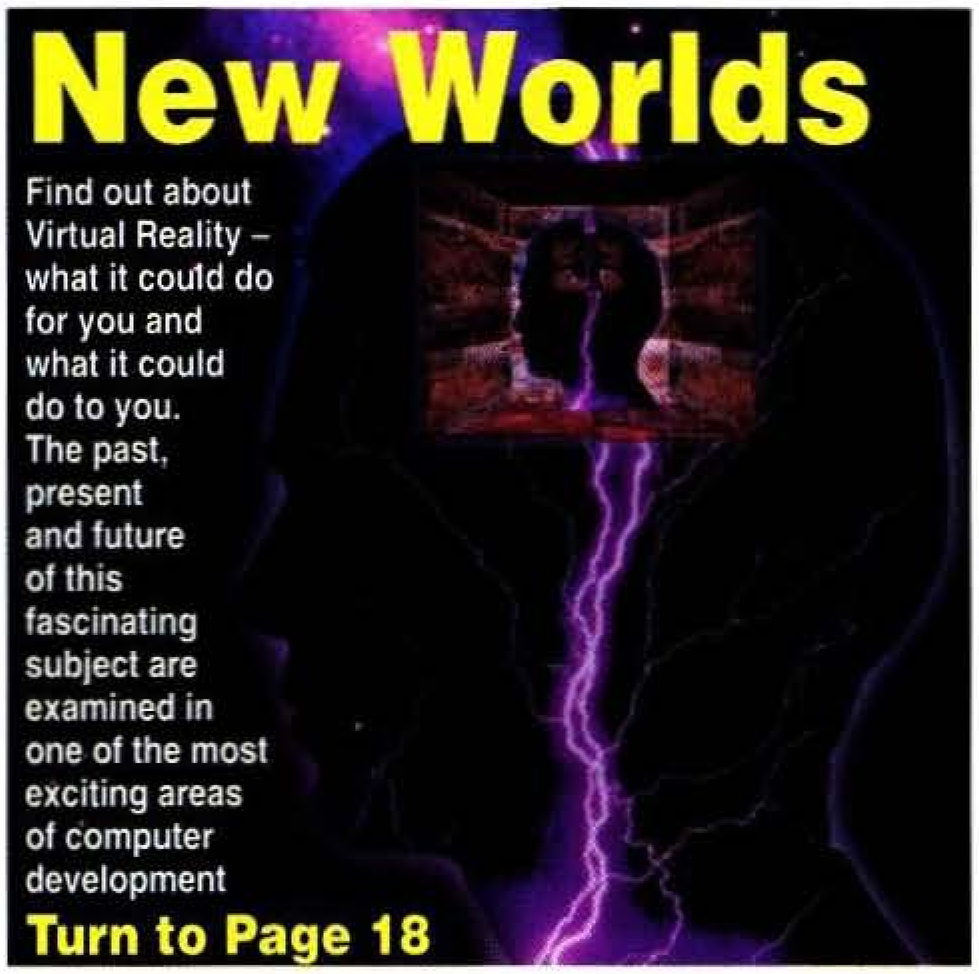
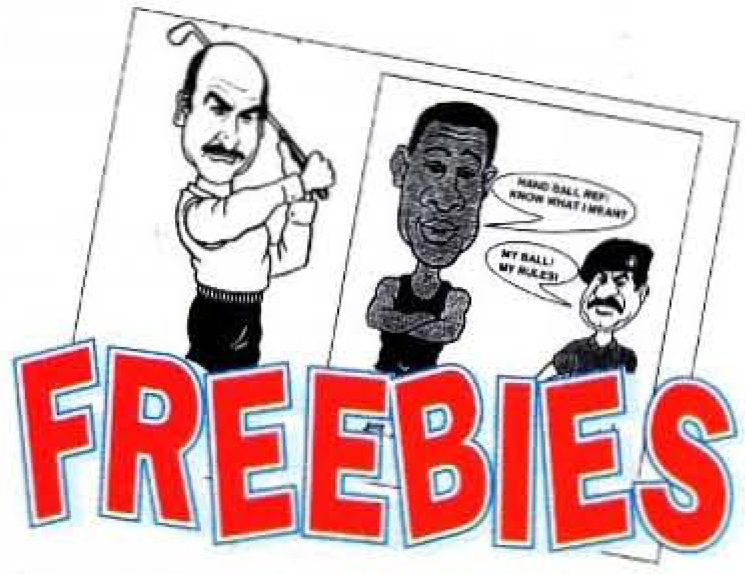
New Worlds



Find out about Virtual Reality – what it could do for you and what it could do to you. The past, present and future of this fascinating subject are examined in one of the most exciting areas of computer development

Turn to Page 18


HAND BALL, REF! KNOW WHAT I MEAN?
MY BALL! MY RULES!

FREEBIES

There are five copies of Sherston's topical and humorous Split-an-image clip art with a difference awaiting the first five readers to reply.

Turn to Page 16

SPECIALS

85 **Balls of Destiny** Fast action in a world of spheres and squares inside a sub-atomic shell. *

97 **Into the web** The screen designer featured in last month's game, Arachnoids. *

Mad Hatter Challenge

Our arch-adventure guru challenges you to the Archimedes Elite Arries-Diquer Rally. There's a unique special edition sweatshirt to be won

Turn to Page 24

Ten games for a tenner

- it's history in your hands.

See Page 36

Type-it-in

This symbol * indicates that the feature contains at least one full length listing for you to key in on your micro.

Get it right ✓

All the major listings in this magazine are accompanied by checksums to help you key them in correctly.

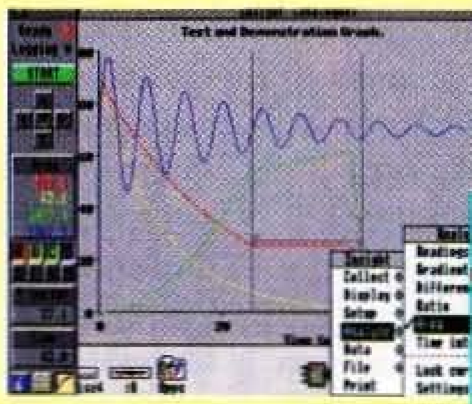
For full details of how to use them see the article on Page 86 of the February 1992 issue

EDUCATION

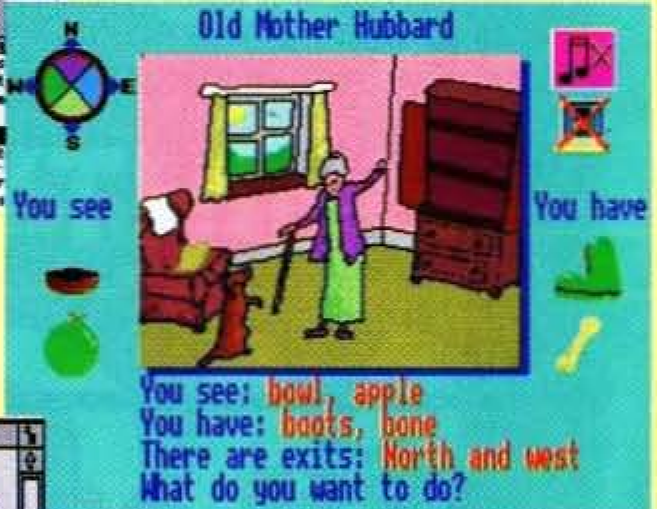
29 **Update** The latest details on new products and events in the world of the Acorn machines and education.

31 **Reviews** Catch our experts' views on the very latest products for home and school:

- Adventure Playground
- Archimedes Control Logo
- Insight



Insight



You see: bowl, apple
You have: boots, bone
There are exits: North and west
What do you want to do?

Adventure Playground

adfs::Control.$
!Control
!CopyCatrl
1point1
Backup
Control
Keystrips
ReadMe

Archimedes Control Logo

REGULARS: News 11 ● Mad Hatter 24 ● P

Essential Archimedes

Make your learning curve even easier with our four how-to-do-it series for all Archimedes, A3000 and A5000 users.

55 **DTP** Make the most of fonts and discover the Alt key.

58 **Spreadsheets** Our expert takes you through the finer details of display.

62 **Databases** Step-by-step guide to sharing information between programs.

65 **CAD** Learn to create your own labels for jams and preserves.

LET'S COMPUTE!

Discover the basics of computer programming the easy way.

88 **Rom & Ram** The dynamic duo learn how to jump in and out of PROCs.

92 **Safe Scientist** The professor gives himself a headache as he splits the atom.

NEWCOMERS

38 **Presentation graphics** Three packages put through their paces – which displays your information the best?

42 **Vox Box and Score Draw** We assess a couple music packages that complement Rhapsody II.

83 **Calc** A spreadsheet that keeps an eye on the pennies. Is it value for money?

COMPETITION

Your chance to win your very own Oldham Overlay Keyboard for home or school. Five keyboards must go – education hardware worth £600.

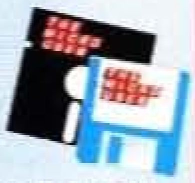
TURN TO PAGE 95

Bargain basement is open on Page 100

Hardware and software classifieds

SUBSCRIBE NOW!

FREE disk of software every month



This month's discs are chock full of goodies from the program listings, public domain goodies and the Body Building course. The 8-bit BBC Micro disc is crammed with some superb sound sample processing software.

The Archimedes disc featuring an extraordinary new program from CIS: Sound FX Maker is a great opportunity for anyone interested in sample sounds to make the most of their Archimedes' capabilities. A full review of this powerful piece of software will be in the May issue – If you'd like to know more about how to get your very own disc each month then turn to Page 112.

– and you could win one of these!

Take out a subscription to *The Micro User* this month – or renew an existing subscription – and enter our fabulous contest.

The prize: The just-unveiled sensational Iota 3D Image Scanner, or the state-of-the-art BBC A3000. Full details on Page 112.

Screen Play
PRESENTATION

Swiv

Cataclysm

Dreadnought

Our experts sift through the latest games releases, plus a bit of ScreenChat. See Page 45.

NEXT MONTH IN THE MICRO USER

We get into communications with the FaxPack, have an Archimedes Accounts package showdown, take an in-depth look at Sound FX Maker and put the new PC cards through their paces. Plus all our regulars and the money-saving PD page.

blem solved 26 ● PD Page 99 ● Body Building 101 ● Letters 104

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Phone lines open :-
Mon - Fri 09.00 - 17.00
Sat 10.00 - 17.00

FAX: 061 766 8425

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A540 inc. 4Mb Ram, 120Mb HD, Arm3, Taxan 775	£2495.00
A5000 inc. 2Mb Ram, 40Mb HD, Arm3, Acorn Multiscan Monitor	£1499.00
A5000 Learning Curve as above c/w Audio Training Cassette, Guide to National Curriculum, Acorn Applications Suite, Pacmania, PC Emulator , Genesis, 1st word Plus, Acorn DTP	£1531.06
A5000 LC / Acorn Printer as above c/w Acorn JP150 Inkjet Printer	£1765.96
A3000 c/w 2Mb Ram fitted	£599.00
A3000 Learning Curve as above c/w Audio Training Cassette, Guide to National Curriculum, Acorn Applications Suite, Pacmania, PC Emulator, Genesis, 1st Word Plus	£642.29
A3000 LC / Acorn Monitor as above c/w Acorn Colour Monitor	£855.05
A3000 LC / Acorn Monitor / Acorn Printer as above c/w Acorn JP150 Inkjet Printer	£1089.95

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A3000 Special Access Acorn Serial Upgrade, Morley User/Analogue Expansion Card, Acorn Software Suite, Utilities Disc, SEMERC & ACE Special Needs Handbook	£679.00
A3000 Special Access / Acorn Colour Monitor / Stand as above c/w Acorn Monitor and Pres Monitor Stand	£899.00
Master 128	£399.00

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Please call for free information pack

A540 Upgrades

4Mb Ram Upgrade	£369.00
Taxan 795 VIDC Modes Disc	£7.50
Technical Reference Manual	£65.00

A5000 Upgrades

2Mb Ram Card	£110.00
Technical Reference Manual	£65.00

A400 Upgrades

1 Mb Ram	£35.00
2 Mb Ram	£65.00
3 Mb Ram	£99.00
20 Mb Hard Disc (ST506)	£145.00
40 Mb Hard Disc (ST506)	£245.00
5.25" Ext. floppy disc int.	£39.00
ARM 3 Upgrade (Aleph 1)	£199.00
Econet Module	£46.00
VIDC Enhancer	£29.00

A3000 Upgrades

1 Mb Ram (2 Mb in total)	£55.00
4 Mb Ram	£159.00
20 Mb Int Hard Disc (IDE)	£199.00
5.25" External f/disc buffer	£39.00
Serial Upgrade	£19.00
Serial Link Kit (BBC-Arc)	£14.00
User & Analogue Podule	£46.00
User & Midi Podule	£46.00

Expansion Cards

ArVis S-VHS Video Board	£295.00
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ArVis Video Graphics Board	£877.00
Chroma 345 Overlay Board	£389.00
Econet Module	£46.00
Ethernet Expansion Card II	£249.00
Floating Point Expansion Card	£449.00
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I/O Expansion Card	£79.00
Midi Upgrade to I/O Card	£27.00
Midi Expansion Card	£65.00
ROM Expansion Card	£45.00
SCSI Expansion Card (Acorn)	£229.00

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Microvitec Cub 3000	£199.00
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Philips Mono (Green)	£85.00

All monitors come with free lead. State type of computer when ordering.

Multiscan Monitors

EIZO 9060SZ Flexiscan	£419.00
EIZO 9070SZ Flexiscan *	£599.00
Taxan 775 Multivision	£389.00
Taxan 795 Multivision *	£449.00
Taxan Viking II Mode 23	£749.00

* comes with free VIDC enhancer.

Floppy Disc Drives

5.25" Single 40/80 no psu	£95.00
5.25" Single 40/80 with psu	£109.00
5.25" Dual 40/80 no psu	£185.00
5.25" Dual 40/80 with psu	£199.00
3.5" Single with psu	£85.00
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Canon Bubblejet BJ-10e	£239.00
Sheetfeeder for BJ-10e	£59.00
Citizen 120D+	£114.00
Citizen Swift 9	£169.00
Citizen Swift 24e	£239.00
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Citizen Swift 224	£199.00
Citizen Swift 224 Colour	£229.00
Citizen PN48 Portable	£249.00
Star LC20	£130.00
Star LC200 Colour (9 pin)	£189.00
Star LC24 - 200	£219.00
Star LC24 - 200 COLOUR	£259.00
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Integrex Colourjet 132	£519.00
HP DeskJet 500C	£599.00
HP Paintjet	£695.00
Laser Direct (Qume)	£749.00
Laser Direct (LBP4 Hi Res.)	£899.00
Laser Direct (LBP8 Hi Res.)	£1289.00

Oak Products

Worra Winnie (SCSI)

45 Mb Internal Hard Disc	£349.00
80 Mb Internal Hard Disc	£389.00
100 Mb Internal Hard Disc	£489.00
200 Mb Internal Hard Disc	£875.00
20 Mb External Hard Disc	£344.00
45 Mb External Hard Disc	£429.00
80 Mb External Hard Disc	£485.00
100 Mb External Hard Disc	£595.00
200 Mb External Hard Disc	£925.00
Oak Recorder	£29.00

Econet

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Level 4 Software	£199.00
Cable - 100m	£90.00
Econet Starter Kit	£80.00

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Flatbed A4 256 Grey SCSI (CC)	£849.00
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Midnight Graphics

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Star XB24 Sprite Dump	£26.04
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Star LC24-200 Sprite Dump	£26.04

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Kourtyard	£9.95
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Reversals (80 Track Only)	£20.00
UIM	£14.95
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White Knight	£18.00
White Magic	£11.26

Master Compact

Play It Again Sam No's 1 - 16 ea.	£13.00
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ViewSheet	£40.00
ViewStore	£45.00

Archimedes Software

4 Mation

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Jigsaw	£29.00
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Longman Logotron

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Landmarks No's 1 - 4 each	£19.00
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Minerva Software

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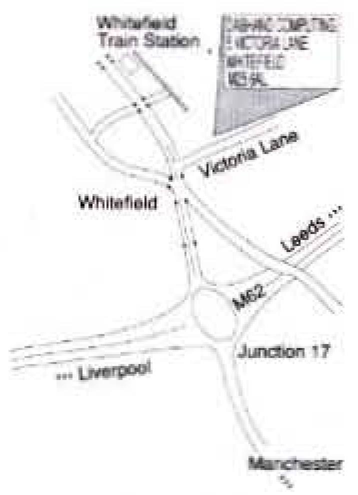

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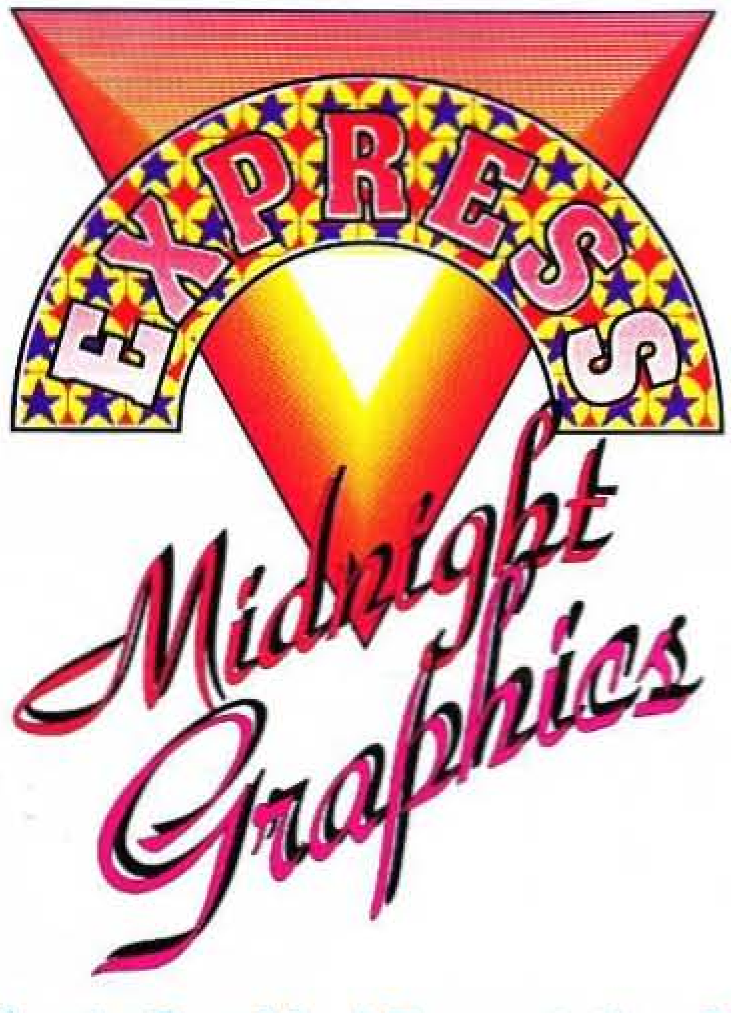

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This advert can only give you brief details of our product range. Please contact us for a copy of the more detailed Product Guide. In many cases a full product specification is also available.

TS 1992

HARDWARE

LaserDirect Qume

NEW LOWER PRICE

6 pages per minute, 300 dpi
An incredibly low price for such a high quality printer. And not only do you get high performance, but the Qume is cheap to run - only 1.6p per page.

Price: £799.00 +VAT (£938.82 incl.)

Not suitable for the A540.

LaserDirect HiRes 4

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This must be the cheapest 600 dpi laser printer available. But there's no reduction in the print quality or print speed. As LaserDirect HiRes 4 uses the Canon LBP-4 printer, you can also connect the printer to other types of computer such as a PC (although, when connected to these machines, printing is limited to 300dpi.)

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James Wyatt
Acorn

ScanLight A4

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ScanLight Professional

A stunning recent addition to the ScanLight range, this professional quality flatbed scanner gives unequalled results. Up to 300dpi with 256 grey-levels means that images from this scanner can be included directly in typeset output. Connects to the Archimedes using a SCSI interface.

Price: £899.00 +VAT (£1056.33 incl.)
including SCSI £999.00 +VAT (£1173.82 incl.)

FaxPack

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Brings full fax capabilities to your Archimedes. Appears as a standard RISC OS printer - it takes only a few seconds to send a fax from any RISC OS application. Sends and receives in the background.

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- 410/1 to 420/1 requires 1Mb
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1Mb - £35 2Mb - £64 3Mb - £98

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- Includes free MEMC1a upgrade
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- Courier collection & fitting included
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2nd Mb - £99 4th Mb - £199
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A3000 Memory

- Uses only eight RAM devices
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- Uses only eight RAM devices
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Two memory cards - £520
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- Increases A5000 memory to 4Mb
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- No special tools required

A5000 4Mb RAM - £110 4Mb to 8Mb RAM - £399
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- Increases resolution with all Multiscan monitors
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VIDC Enhancer - £25 A540 mode software £5

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- Including One cartridge, drive unit and all cables
- 42Mb removable cartridges
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A5000 - £1499 A5000LC - £1531
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NEWS BEAT

It 'ASDA be Acorn

THREE Acorn A5000 computers can be found at the heart of the new Asda in-store radio station transmitted over the Astra satellite. AsdaFM was especially set up to transmit a selection of music, adverts and consumer messages to their 150 superstores around the UK.

The software which drives the jukeboxes is a version of Trackstar which has a track record on Acorn machines in a number of other radio stations: CNFM in Cambridge, Sunset in Manchester, KFM in Stockport and CoolFM in Belfast as well as two stations in Malaysia. The software is capable of driving multiple radio networks and can handle up to 2,500 CD-based tracks.

One A5000 is used to program the transmission sequence while another drives the CD-jukeboxes, with the third looking after the distribution through the ISDN circuit. As the computers are networked they provide a backup to each other should a problem arise.

The broadcast signal is then transmitted via one of the sound carriers on Channel 16 of the Astra satellite and picked up in the Asda stores using a Norsat receiver/decoder (0522 730920). The broadcasting began last August running on IBM-compatible PCs. However, as Norsat's European Director, Tom Woodford explained, the PCs couldn't offer the reliability essential for the station's unattended operation, nor did it offer expansion possibilities: "Because of the Acorn A5000's true multi-tasking capability any computer in the network can handle all the tasks of the others.

"In this way we have achieved that vital reliability, while at the same time the extra computer power is allowing us to expand the system to control several satellite radio services simultaneously. The Acorn computers offer us an ideal solution."

The complete system was supplied by Audio Systems Components (0734 811000) who are working on the installation of an Acorn computer driven CD-jukebox system in one of the BBC's newest local radio stations. They are also working with Norsat in a more complex system being developed for larger, multiple networks in Germany and France, adding data and electronic mail facilities to the basic radio service.

The CD story

THERE are good guides to nearly everything these days and the Archimedes is proving its worth in book production yet again, with the *Good CD Guide 1992*.

General Gramophone Publications produced the book in-house on its Archimedes. Diannah Lone of RSCG Conran created a template for the book pages on an Apple Macintosh, producing a series of symbols with Letraset FontStudio. The templates and symbols where then supplied in PC format to GGP.

Using a PC disc reader on the Archimedes – and a lot of trial and error – they got the template and information together. GGP laid out the 600 pages of information in less than four months – a huge advance on the usual time it takes for this type of book to be produced.

Asking questions

A NEW series of Archimedes education products for home and school are in preparation by Cambridge International Software (071-226 3340).

Called Inquisitor the series will cover a whole range of topics including: The body, Geography for key stages 1, 2, 3, and 4 as well as History. more Geography, Science to all levels and modern languages.

The programs will consist of genesis-like pages. When you select a particular button with the mouse you'll be asked a question, which can be a means in itself or a basis for further work or revision.

This is the first commercial product to be written in Craddock Computer Systems' HelixBasic. Each Inquisitor package will cost around £14.95.

New Ace colour driver

AS the A5000 begins to make its presence felt in the marketplace, Ace Computing (0223 462212) are extending their range of printer drivers. The latest arrival is a Risc OS 3 HP colour printer driver which will drive the DeskJet 500C, as well as the HP PaintJet and PaintJet XL.

The driver generates a range of dpi from 75 to 300, using data compression techniques to speed output. It complements the existing Risc OS 2 driver and costs £18.80.

Hit and run

THE pages of *The Micro User* first highlighted the growth of Steve Parkinson's space odyssey in the Diary of a Game feature. If you want to see for yourself how the game finally came together you can get a copy from TCA (0582 761395).

Available for the BBC and Master at £14.95 (5.25in) and £15.95 (3.5in) it is now called Paradox. In a puzzle game with arcade elements, you fly a time-warped ship trying to return home. Over the 50 levels you'll find numerous hazards and obstacles including some very unfriendly defence systems.

Blast into time and space

RISC Developments Software

Desktop Thesaurus

NEW

Desk Top Thesaurus

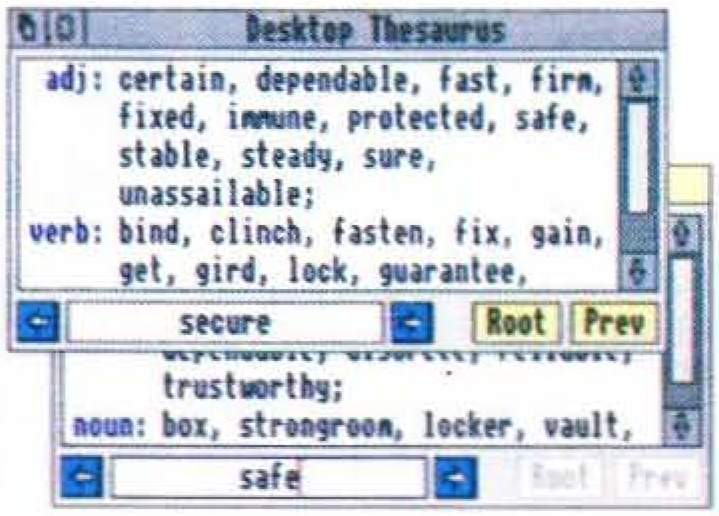
Desktop Thesaurus contains over 11,000 keywords and nearly 90,000 carefully chosen alternative words. It is ideal for developing language skills in the office, in school or at home.

The synonyms for the required keyword are listed in a scrolling window according to parts of speech, so nouns, verbs etc are grouped together. Clicking on any synonym itself then selects that word as a keyword and displays its synonyms, allowing you to browse through the data for the ideal alternative word. You can step back through earlier keywords, or step through the keywords in alphabetical order. When you have located an alternative word, it may be transferred instantly into almost any compatible application for you. Ideal for use with Ovation, Impression, Edit, Pipedream, 1st Word Plus, Pendown, Desktop Folio and other desktop publishers and word processors.

Desktop Thesaurus uses a compression system allowing the Thesaurus data to use disc space efficiently. Thesaurus data is accessed directly from disc saving valuable RAM, but is almost instantaneous from hard disc (a little slower from floppy disc).

Thesaurus data may be exported as plain text for editing, and the modified file re-imported into the Thesaurus. This powerful feature allows the Thesaurus to be easily modified or expanded. Due to the large size of the uncompressed data file, it is not possible to use this feature on a 1Mb RAM machine.

Price £19 + VAT **Site Licence Price £95 + VAT**


Desktop Thesaurus

adj: certain, dependable, fast, firm, fixed, immune, protected, safe, stable, steady, sure, unassailable;
verb: bind, clinch, fasten, fix, gain, get, gird, lock, guarantee,

trustworthy;
noun: box, strongroom, locker, vault,

Ovation

Ovation sets new standards of quality and value by offering professional features in an easy-to-use package at a very competitive price. We guarantee that you will be able to produce high quality documents within hours of opening the package. Ovation provides a formidable array of desktop publishing features, yet can be used just like a traditional word processor to produce single page letters or entire books with complete ease. The package includes a 250 page user guide suitable for both novices and experienced users, a quick reference card, 7 outline fonts, and a range of clipart.

- *multitasking/multi-documents* • *full WYSIWYG display*
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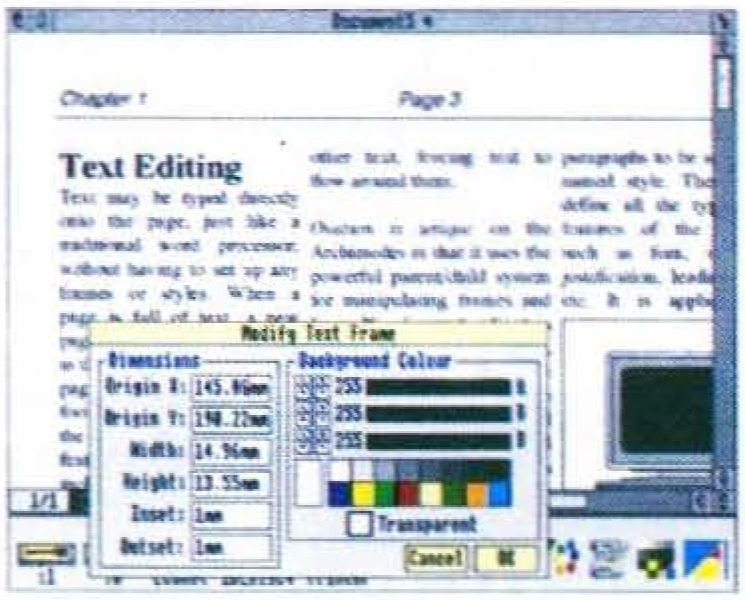
- *full colour support* • *linked frames* • *multiple columns* • *stylesheets*
- *definable frame borders* • *auto hyphenation (needs 2Mb)*
- *find & replace* • *line drawing* • *cut, copy, paste via clipboard*
- *dot-matrix & laser printer drivers*

Price £99 + VAT **Site Licence £475 + VAT**



Modify Text Frame

Dimensions
Origin X: 145.96mm
Origin Y: 198.22mm
Width: 14.96mm
Height: 13.55mm
Inset: 1mm
Outset: 1mm

Background Colour
255
255
255
☐ Transparent

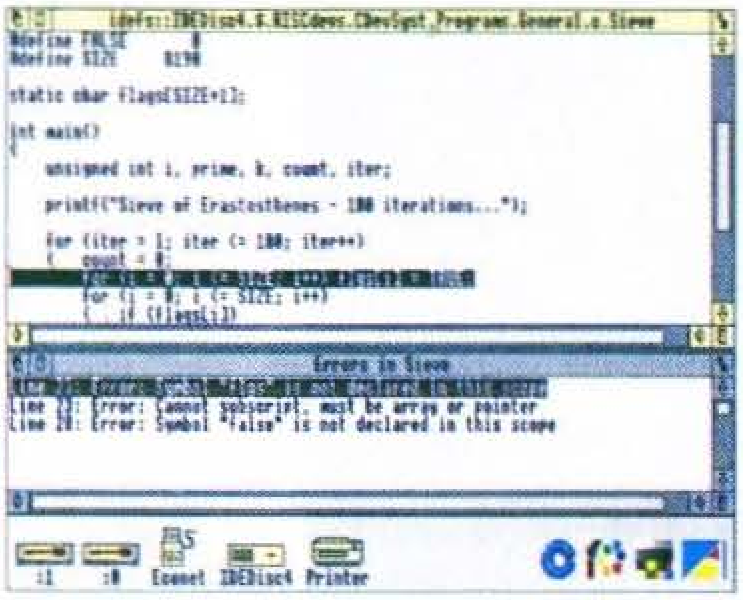
C Development System

The C Development System is a complete C language conforming to almost all of the ANSI specification. The package contains a compiler which is quick, easy-to-use and generates ARM code which may be linked to other programs using the linker.

Also included is a multi-tasking editor from which programs may be written, compiled and executed without leaving the desktop. In fact you can compile, link and run C programs at the press of a key. The compiler errors are automatically highlighted in the editor for easy correction making it ideal for beginners learning C.

The package also includes a range of RISC OS functions, a library manager for creating new libraries, a Make utility, and a built-in ARM assembler for advanced users.

Price £77.39 **Site Licence £385 + VAT**


IDEFS::IDEDisc4.$.RISCdevs.CDevSyst.Program.General.c.Sieve

```
#define FALSE      0
#define SIZE       8190

static char flags[SIZE+1];

int main()
{
    unsigned int i, prime, k, count, iter;

    printf("Sieve of Erastosthenes - 100 iterations...");

    for (iter = 1; iter <= 100; iter++)
    {   count = 0;
        [illegible]
        for (i = 0; i <= SIZE; i++)
        {   if (flags[i])
```

Errors in Sieve

```
[illegible]
Line 23: Error: Cannot subscript, must be array or pointer
Line 28: Error: Symbol "false" is not declared in this scope
```

RISC Developments Ltd. 117 Hatfield Road, St. Albans, Herts. AL1 4JS Tel. (0727) 40303 Fax. (0727) 860263

Books on screen

NEW company Books on Disk (0223 462244) are providing a unique service for computer users. They have catalogued over 2,900 computer books, manual and training programs and the catalogue is now available on disc.

You can make your selections and print your order which will automatically add the price, postage, packing and VAT where applicable.

The lists are available on PC disc – which can be read via the PC emulator or BeebDos – and they contain books on the BBC and Archimedes as well as other computers. The program is menu-driven and gives you a database search facility based on keywords for titles, authors or publishers.

Ribbon saver

QUILL Marketing (0603 746970) are importing a ribbon re-inker claiming to save up to 95 per cent of fabric ribbon costs with no fuss and no mess. Called the MaxiPrint, it was developed in Singapore.

The MaxiPrint uses a specially-designed ink cartridge system which is convenient and mess free. Purportedly a single fabric ribbon can be re-inked up to 50 times. One major development is that one kit can be easily adapted to cope with any of the fabric cartridge ribbons now on the market.

MaxiPrint comes in kit form and costs £33.45 with two ink cartridges. It uses a high quality indelible fade-resistant black ink, with replacement cartridges in packets of six. Also available is a range of colours and special inks and an optional electric powered motor to wind the ribbons.

Tidy minds

IF YOU look at your desk and can't remember if it is made of wood, perhaps you need organising. Innova (0332 824781) has released a range of products to help.

The new Keyboard Organiser provides slots for discs, pens, pencils, paper clips and a memo pad, as well as storage for a mouse and mouse pad – all for £39.95. A clear plastic cover protects the keyboard when it's not in use and easily converts to a copy holder with an integral wrist rest that will improve typing efficiency and comfort.

Next is the Essentialize. At only £9.95 it combines a handy disc holder with simple multiple accessory compartments to help keep your desk free of clutter. For those who like to use Stick-its the £6.69 for the Message Minder could be the answer. This holds the self-replicating messages on a flip-up clear plastic bar that folds away when not in use. It holds all your messages and stores a standard 3in x 3in memo pad and a pen in a built-in storage tray.

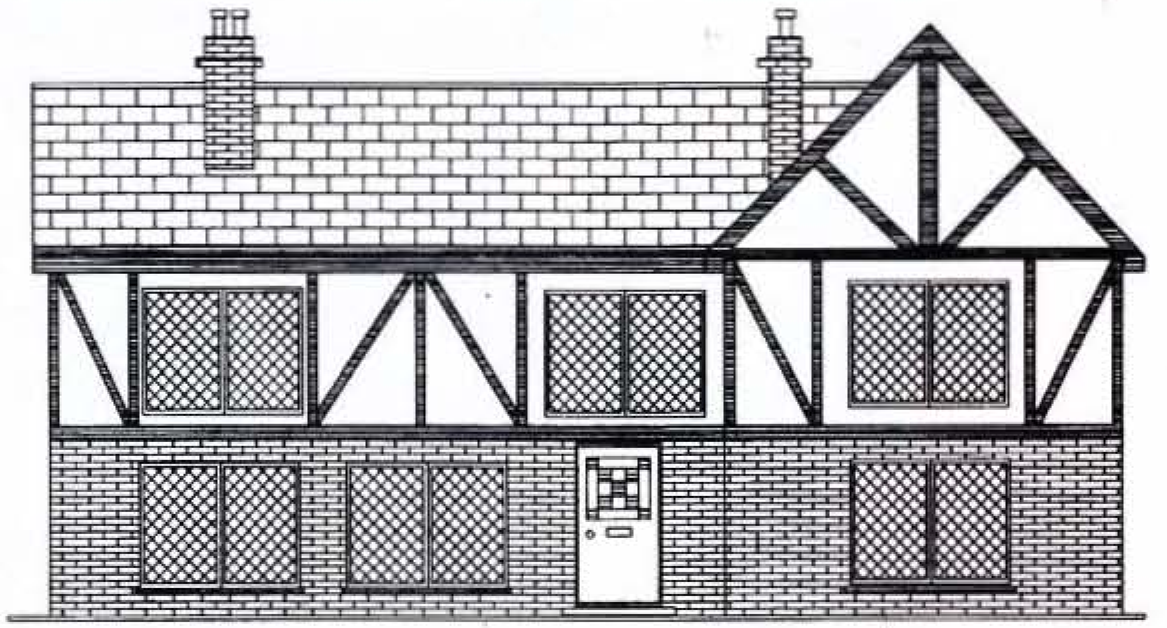
Ten years on

ACORN are celebrating 10 years of the computer literacy program. These revolutionary years will be featured in depth in a BBC 1 TV program on the morning of Sunday April 5.

Called the Trojan Mouse, it concentrates on the history of the BBC Micro from its small beginnings. This is your chance to see the developers and originators including Herman Hauser, Roger Wilson and David Bell, being interviewed.

It should be an interesting insight into the computer industry as a whole and into a range of machines, whose roots are in education, with branches in 1992 in all aspects of computing.

Teaching CAD



COMPUTER Aided Design can appear very daunting, but the Archimedes makes life easier, with Linear Graphics' (0686 629292) LinCAD Risc OS Tutorial Sessions aiming to make life easier still.

If you have a demo version of LinCAD you'll already have seen the first tutorial which gives 32 tasks to explain the basics of CAD. There are five such tutorials in total costing £35.

Linear Graphics are moving into the field of CAM – Computer Aided Manufacture – later this year with the release of LinCAM. Many schools have a milling machine at their disposal which is not being used to the full, mostly due to the fact that they have to be programmed with G & M codes.

After making your design in LinCAD, you can look down on a 3D surface with 16 colours each representing a different depth of cut. Transferring your design into LinCAM automatically drives the milling machine. LinCAM costs £150 and at present drives the Boxford range of milling machines, though this is being enhanced so that all makes will be supported.

Available now is BackPlot, which is a very useful utility costing only £35. Plotters give good results, but are notoriously slow, tying up a machine for long periods of time. BackPlot lets you take a spool file into its icon and plots in background mode, freeing the Archimedes for other tasks.

This program will work with all plotters and you can even extend its range to cover the Roland CAM 1 and CAM 2 as they use plotter commands. The CAM 2 is an engraving machine and after discussion with some schools, Linear Graphics found that there was a need for software to help integrate this piece of hardware into the National Curriculum.

This led to the creation of a quite specialised program called DrillSpot, £120. Having created a PCB – printed circuit board – on an separate Archimedes package, it is now possible to use a CAM 2 and DrillSpot to drill the holes accurately.

Under development is DrawPlot which is due for release in the summer. The Archimedes has no native plotter driver as it lets you load one colour on top of another. This makes no difference to a colour printer, but on a colour plotter this leads to overplotting and a mess of colours.

With this new utility you can drag your file from any drawing package on to the icon bar icon. DrawPlot will then intelligently remove the overplots, easily enabling you to create good colour A3 results on a plotter.

Speedier refresh

GERMAN-based Evolution Computers (0922 55128) are about to release the Speed Graph expansion card for the Archimedes. This board promises to give higher graphics resolution with faster screen refresh rates. This should make it possible to display of 800 x 600 pixels with 256 colours and a refresh rate of 72Hz. If you are only using 16 colours the display will be 1,024 x 768 pixels with a refresh rate of 60. Software Evolutions promise that higher resolutions are available too.

Speed Graph will not affect the processing speed of the computer as has been reported with some simple VIDC enhancers. You will need a multisync or VGA monitor though, but Speed Graph hardware doesn't occupy a podule place. Rather it sits in an external box and will work with all existing Archimedes from the A305 to the R260.

386PC in an Arc

FOLLOWING the news story last month, Aleph One's 386PC card is now shipping. The RRP has been fixed £100 lower that predicted, at £495 for the 1Mb ram version and £625 for 4Mb. You will have to have a copy of the Acorn PC emulator – version 1.06 or later – to install the 386PC support software.

Everything you need to know about your Archimedes...

RISC USER

the most popular subscription magazine for the Archimedes, Archimedes A3000 and A5000

For your subscription (£19.90 a year for UK)
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RISC Developments
117 Hatfield Road
St. Albans Herts AL1 4JS

...you can find in RISC User magazine

Here are just some of the subjects covered in the most recent issues:

ALEPH ONE'S PC EXPANSION CARD
A review of the first PC card for the Archimedes.

MULTIMEDIA
A survey of the new developments in the multimedia field, in which the Arc looks likely to excel.

EXPLORING UNIX ON THE ARC
An look at this internationally accepted operating system which can be run on an Archimedes.

SQUIRREL
A review of this powerful database management system from Digital Services.

ARMED AND READY FOR BATTLE
A look into the latest developments and the future of the ARM processor.

EXPLOITING THE WIMP
A series on some practical aspects of WIMP programming.

QUICK ON THE DRAW
A comparison review of three packages which aim to create Draw files from sprites.

COLOUR PRINTING WITH THE DESKJET 500C
A revolution in low cost colour printing.

VIDEO ON YOUR DESKTOP
A review of a new hardware add-on allowing a video input to be displayed in real time in a window on the screen.

DESKTOP ANIMATOR
A tutorial mini-series on how to program moving images within a Desktop window.

USING ANSI C
A series of articles on programming Desktop applications in C.

WP/DTP
A regular column on using different DTP and WP packages.

INTO THE ARC
A regular series for beginners.

ARCADE
A look into the latest games. for the Archimedes.

Following glowing reviews in the computer press ...
... a new version of **DeskEdit** *(V 1.20)*
has now been released

with even more features for text editing and word processing tasks, Basic and C source editing

Acorn User
...offers much to the user... a good deal of thought has evidently gone into its development...
... a worthwhile upgrade from Edit

Archimedes World
...replete with well thought out and flexible features... very attractive... remarkably inexpensive for what it offers... should prove very popular.

Archive
...a wonderful piece of software... deserves to be on everyone's icon bar... Acorn would do well to provide it free with every machine it sells... so much (is provided) that you wonder how you managed before.
...macros are...a boon and of great value when writing a program... a truly marvellous set of page and printer control options are included... Everything I wanted was there with clear instructions for use.DeskEdit is a must.

A new ***single key save-and-run feature in Basic mode*** permits virtually instantaneous testing of programs and applications as you edit them.

The ***improved procedure and function browser*** now lets you browse in both directions

In text mode, ***wordwrap control*** is improved, while in ***C mode syntax checking*** is extended, and a special Search option lets you search for function definitions.

Other ***new features*** are: • dynamic date insertion • Left and Right Justify • bracket matching • Align Columns and • the Char Info option.

DeskEdit

is the ultimate all-purpose editor for the Archimedes, with special features for plain text, Basic and C source.

Edit your Basic programs on the desktop and test them interactively with a single key press.

DeskEdit + a 48 page manual + a function keystrip
Price **£24.95** inc + £2.00 p&p Code **PEDTb**

Existing users may upgrade to V. 1.20 by sending their original disc, together with £2.00 and SAE marked **DeskEdit Upgrade 1.2.**

ChartWell

A sophisticated Graph and Chart Package

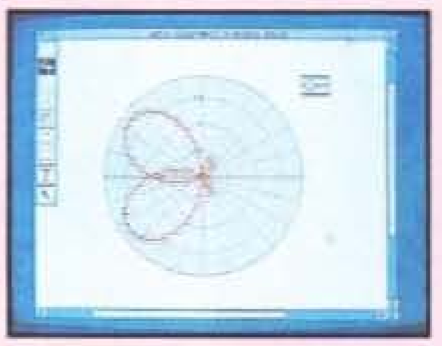
ChartWell offers **24 different graph types**: horizontal and vertical bar charts line graphs scatter charts polar plots and pie charts.

Data can be imported from other applications, such as spreadsheets, databases, or created with a suitable editor as a text file.

Output is in standard Draw format for import into Draw or any other application, DTP for example.

A variety of display options:
flat or 3D bar and pie charts,
user choice of angle for 3D pie chart display,
clustered, stacked or layered bar charts,
scatter graphs with choice of curve fitting techniques, regression lines and correlation coefficients, and use of error bars,
line graphs with choice of normal, cumulative area or stacked area displays.

Complete user control over:
choice of colour,
data point styles,
bar widths and spacing,
use of titles and labels,
legends to provide a key,
graduated/shaded backgrounds,
scales and tick marks, etc.



Use of **'style sheets'** allows a set of options to be saved with data for future reference. User choice of start-up options.

A single chart or graph can **display up to 6 different data sets**, including up to six pie charts in a single display.

Flexibility - you can select only part of the data for display, or change the order of display - i.e. whith bar charts data can be arranged in ascending order.

Chartwell and manual
Price **£29.95** inc + £2.00 p&p
Code **PCHWa**

RISC Developments Ltd. 117 Hatfield Road, St Albans, Herts, AL1 4JS. Tel. 0727 40303 Fax 0727 860263

At your service

CALLIGRAPH (0223 461143) are well known for their direct laser printers – ArcLaser – and they have recently introduced their ArcServer, a high-speed page printer aimed specifically at network use.

Both the ArcLaser and ArcServer use direct printing technology to provide exceptional speeds. By using the Archimedes to control the printer engine directly via software and a high-speed interface, speeds are much greater than with a conventional laser printer.

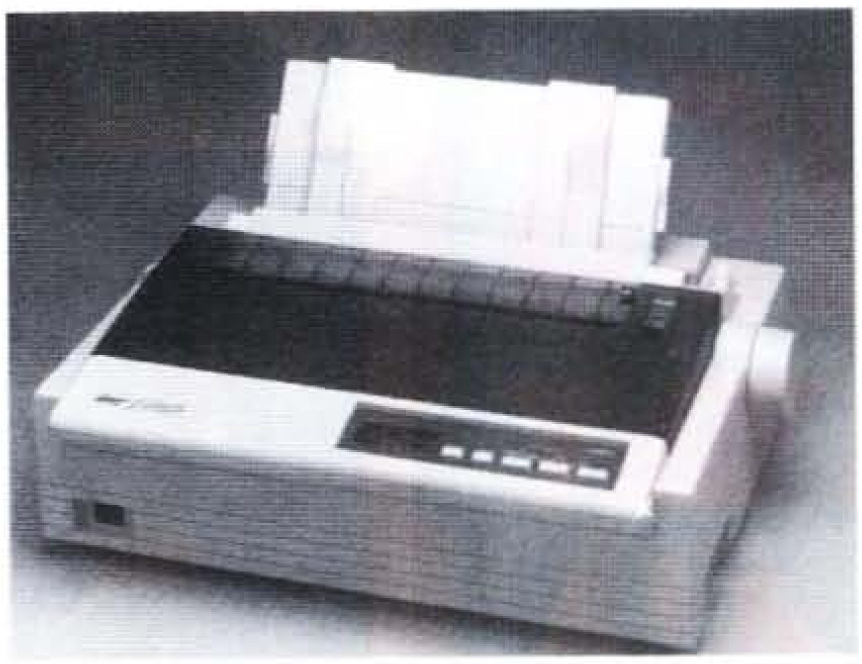
Networked printers are usually heavily used, with people having to queue with their documents. Faster printers speed this process along. The ArcServer has an engine speed of over eight pages a minute. To cope with the extra printing in a network the ArcServer comes as standard with a 250 sheet paper cassette and costs £1,069.

Calligraph have made their ArcServer easy to install: Just plug in a single width expansion card and load the printer driver software. Once set up ArcServer can produce a typical text page in about 10 seconds.

If you plan to use applications which don't access Risc OS – Basic, PC emulator and Ascii files – the ArcServer will emulate a Epson LQ to produce 300dpi pages.

You can use the ArcServer in an Econet system with any Acorn, from BBC to A5000, with a 2Mb Archimedes acting as a file server or from a remote 1Mb Archimedes acting as a printer server.

!SpoolerAl is a software spooler supplied with the printer and has been specially written to speed up document transfer across a network. Free of charge when you buy ArcServer, it can be bought separately for £69.



A new star is born

STAR Micronics (0494 471111) have launched a new entry-level 24-pin dot matrix printer, the LC24-20. It is priced at £259 and is the replacement for the successful LC24-10.

The LC24-20 provides a print speed of 210cps in its high speed draft format with 192cps in draft elite mode and 64cps at letter quality. This printer is the first in the Star range to feature a panoramic custom designed LCD panel.

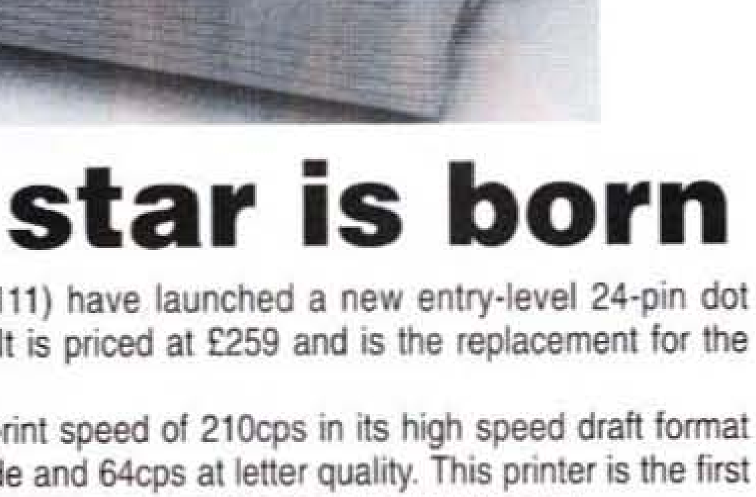
Its paper handling includes a push caterpillar tractor feed with a short form tear-off, auto-load and paper parking even when the optional auto-sheet feeder is fitted. A bottom feed facility allows label and multi-part print runs.

In addition there is a 16k buffer which is expandable to 48k and it is able to print the original plus two copies.

Hamming it up

WHAT do a ham sandwich and Ace Computing's (0223 322559) Euclid have in common? The answer is a new children's science programme on Central Television called, Johnny Ball Reveals All.

Euclid has been used to create and animate a triple-decker sandwich. This spinning sandwich is used to demonstrate how any three points can always be cut through by one plane. The movable feast was created by Ian Lynch, Curriculum Development Director at the City Technology College Trust.

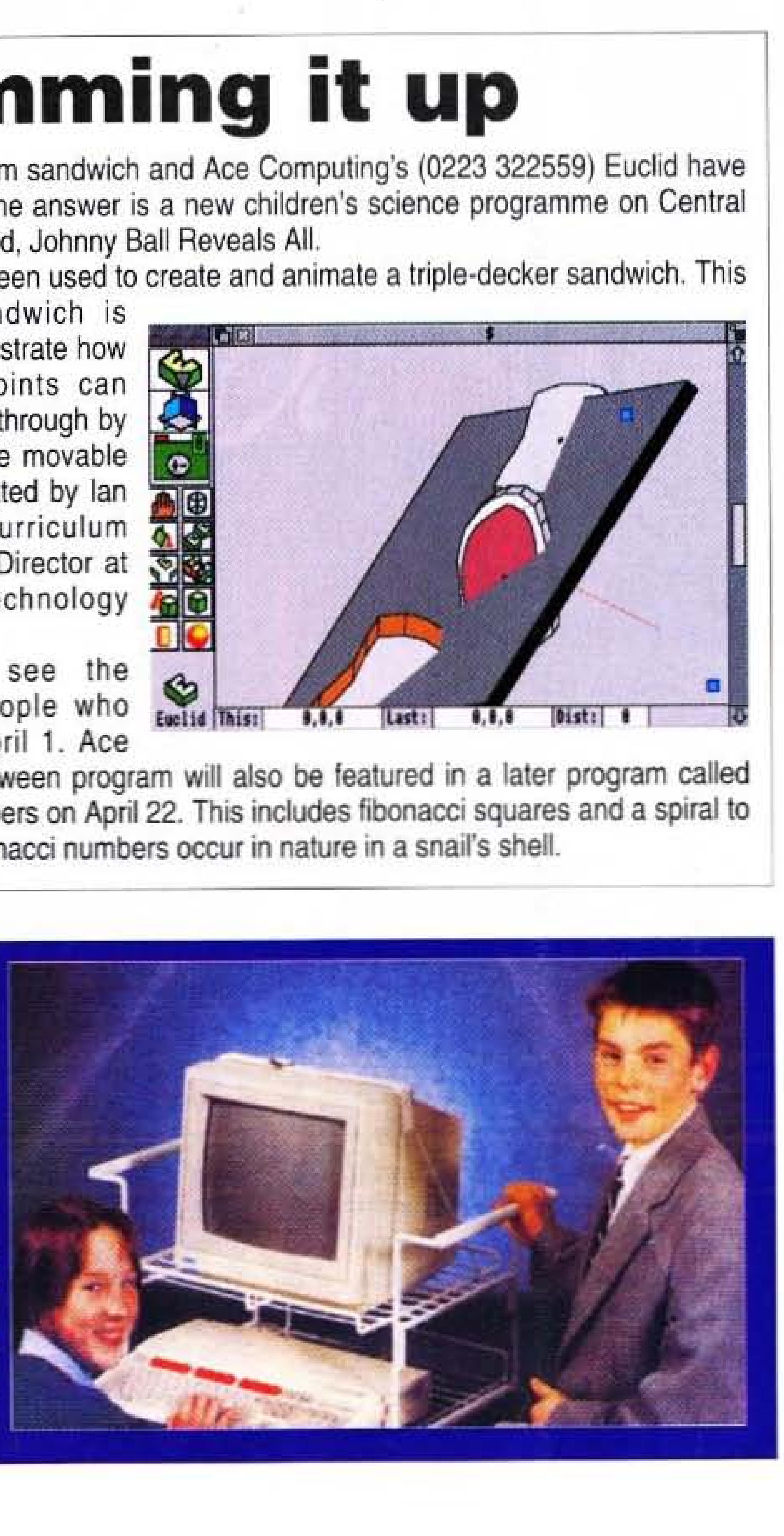


You can see the program, People who Count, on April 1. Ace Computing's Tween program will also be featured in a later program called Nature's Numbers on April 22. This includes fibonacci squares and a spiral to show how fibonacci numbers occur in nature in a snail's shell.

On the move

IF you find that you are moving your computer around, why not resort to a computer basket. Distributed by Rickitt Educational Media (0460 57152) this Australian product is made of strong, lightweight plastic coated wire.

All you need to do is unplug the power and move the system – nothing needs to be disassembled. It makes your computers portable, compact, safe and secure – and it's easier to get up and down stairs than a trolley. There is one universal model, suitable for the Archimedes range as well as BBCs and Masters, available for £69.



Meeting your match

CONNECTIVITY need be a problem no longer. SRS Systems (021-643 2877) have produced a piece of hardware called a Matchmaker. This is a method of connecting virtually any input device to the Archimedes range of computers.

This product has a host of possible applications, but is of most importance at the moment to people with special needs as it allows them to operate any standard software on Acorn's 32-bit machines.

The sensitivity as well as the speed of operation of the attached input device can be set with the Matchmaker. It also comes with the ability to emulate a keyboard and mouse and is compatible with all programs providing complete control of the Archimedes.

One particularly useful aspect to the Matchmaker, is that it can be set to meet the particular requirements of individuals, internally storing the settings for up to four different users. Designed for non-technical people, it does not affect the normal use of the computer, and the LCD screen of Matchmaker displays the easy-to-use menus which adjust the settings. It costs £850.

Making movies

TO facilitate the production of Acorn Replay applications, Acorn have launched a compression service. Run under licence by Uniqueway (0222 615782) the service is available to ISVs, key developers and educational establishments as well as any other organisation with the necessary facilities to process their own material.

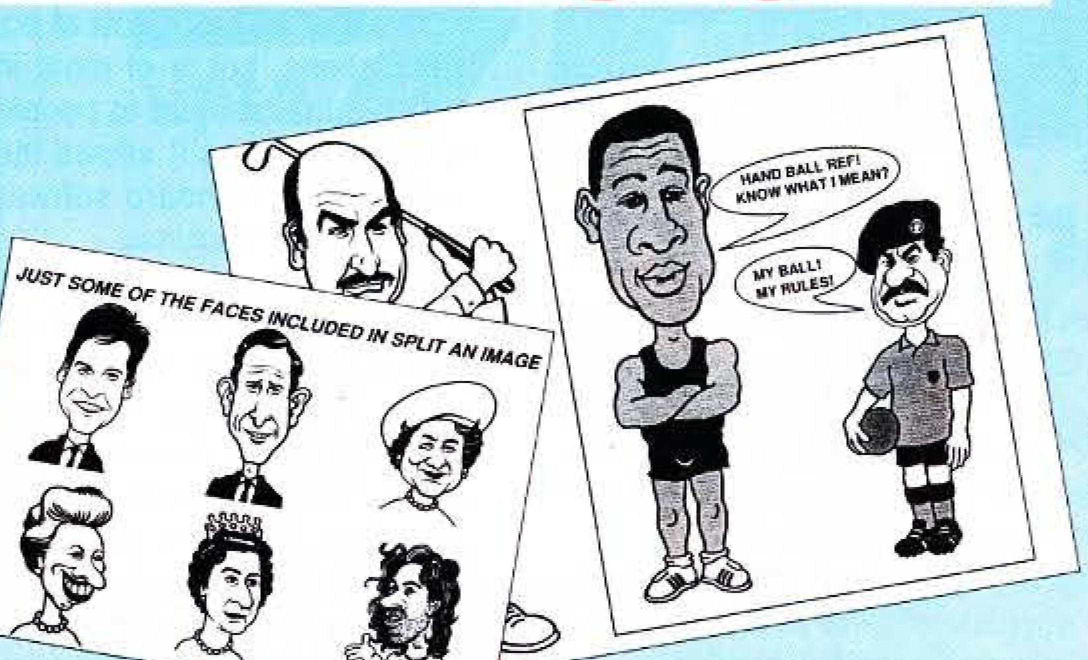
ARMovies can be produced from almost any video tape or film format, but the higher the quality of the source material the higher the quality of the ARMovie. Uniqueway have joined forces with a broadcast video company to offer affordable movies.

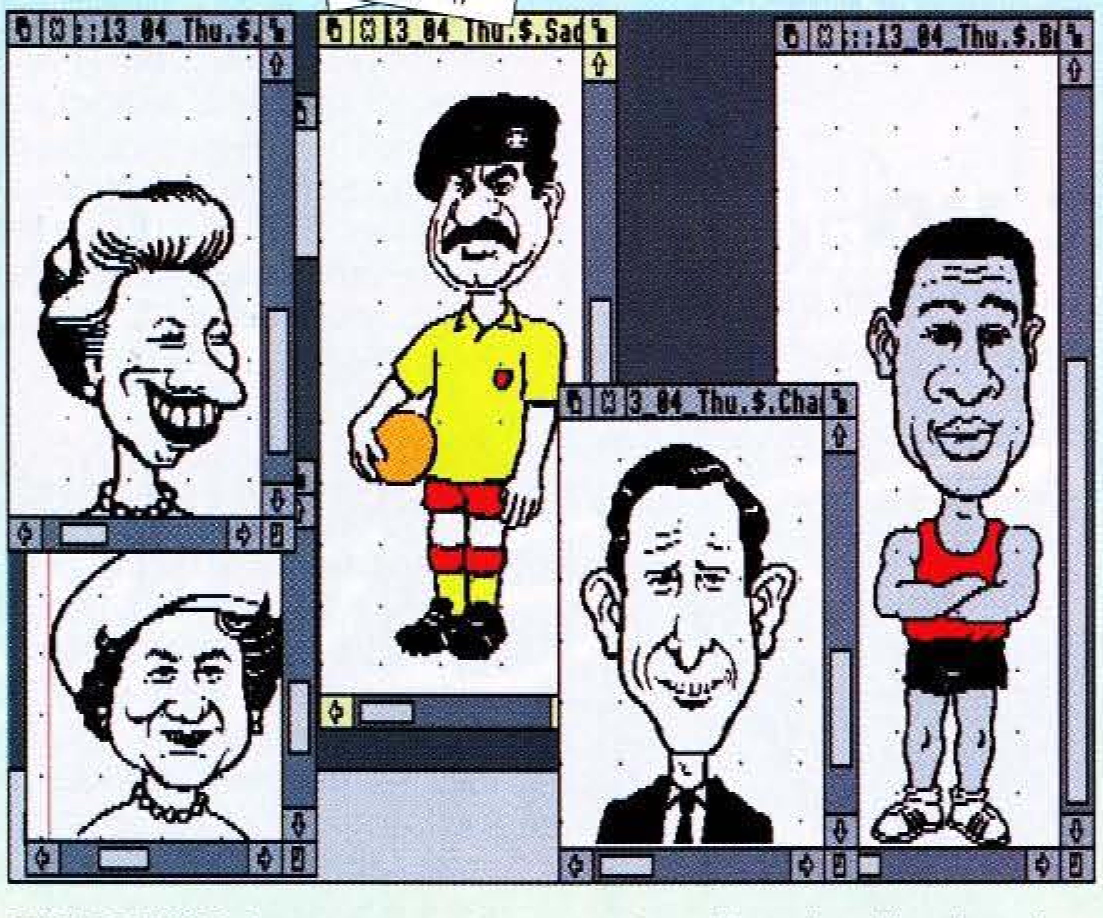
Before the material is compressed it is processed and transferred to a high-quality Betacam SP safety copy used to produce the final movie. Normal turnaround is 72 hours for CDRom compatible movies up to four minutes long. Charges vary from £200 to £300 and completed ARMovies are supplied on 650Mb magneto-optical discs or on the customer's own SCSI disc.

Uniqueway are planning to release their own Acorn Replay CDRoms in the near future and welcome any ideas of what people would like to see in Acorn Replay format.

FREEBIES

...edited highlights


HAND BALL REF! KNOW WHAT I MEAN?
MY BALL! MY RULES!
JUST SOME OF THE FACES INCLUDED IN SPLIT AN IMAGE



SHERSTON Software are renown for their excellent educational products, but they have just released a humorous and topical collection of clip art, Split an Image.

Aimed to coincide with the General Election, the pack contains around 100 drawfiles of the famous and infamous in politics, royalty, sport, music, TV and film. There is a selection of bodies too, so you can split-an-image and mix and match the features of those you love to hate.

Paul Hutchinson is the talented graphic artist responsible for the cartoons, with his creations being scanned into the Archimedes once finished. All the drawings are in drawfile format and organised so that they are easy to manipulate.

As well as the disc there is a guide on how to use Draw as well as how to make the most out of Split an Image – they are even throwing in some activity cards to spur on your imagination.

There are five complete packs, worth £23.44 each, ready and waiting for readers of *The Micro User*.

What to do

To acquire your copy of this unique selection of clip art just write to: **Split an Image Freebie Offer, *The Micro User*, Europa House, Adlington Park, Macclesfield SK10 4NP.**

The packs will go to the first five readers to be pulled out from the sack after April 30 .

Learning through action

ARGUABLY one of the best ways to learn is through experience. Ideally history lessons would mean handling the artefacts as well as interviewing people of the time.

Learning Through Action (0734 665556) is a teaching programme based on the principle that those who are interested and motivated will learn more quickly and retain that knowledge longer. The programme starts with a presentation in the school or at the Reading HQ. A combination of specially developed group role-playing exercises is combined with imaginative use of computers and effective backdrop scenery for atmosphere.

Special computer programs have been developed by LTA using the Concept Keyboard and Touch Explorer Plus developed by the Concept Keyboard Company (0962 843322). For instance in the Seasons of Change package, children touch various areas of the overlay to investigate the life of an agricultural labourer, 19th century corn laws and the Berkshire swing riots.

As well as presentation to schools, LTA conducts a year long diploma course. You don't have to be a computer expert to take part and director and founder Annette Cotterill estimates that approximately 10,000 children each year are reached by LTA.

In addition Reading Museum of Rural Life – where the Seasons of Change program is staged – has installed a concept keyboard as a direct result of the LTA project.

New brothers on the streets

THERE are now two new lasers in the Brother (061-330 6531) range. But these are the first to use the company's own laser engine and are due to be launched in September. The new engine has been developed to bring improvements in design and paper handling to the Brother range.

They have been designed to provide an effective dual-bin operation and to handle a variety of stationery formats with a single adjustable paper tray.

General manager of Brother, John Carter believes that this launch is well timed to take advantage of increasing demand for dual-bin machines: "With more and more companies turning to networks, Brother are leading the way in designing printers with the features necessary for effective sharing."

The HL-10DV offers a wide range of advanced features including high resolution control to eliminate jagged edges, 1Mb ram upgradeable to 5Mb and a high speed printer controller. The HL-10DPS offers full Postscript compatibility with the added advantages of HP PCL Level V and high resolution control, as well as 2Mb ram upgradeable to 6Mb and an Appletalk interface as standard.

Optical extra

MORLEY Electronics (091-257 6355) have just launched a 21Mb optical disc for the Archimedes.

The discs and mechanisms are 3.5in with the system operating through the Morley SCSI interface card. The discs work in the same way as a standard floppy disc drive system. But the 21Mb of storage capacity is significantly more than you can get from a standard floppy.

This amount of storage is achieved by using optical tracking on the magnetic media giving an access times of 65ms.

The drive is 1in high and A5000 owners can have an internal backup solution for the first time. The mechanism will also work as an external device on the A3000 and on the 300, 400 and 540 computers. This allows you to keep the drive and card when you want to upgrade.

Comparing cost per kilobyte of storage a standard 800k floppy is typically 0.09p per k whereas the new optical is 0.16p per k. But prices are bound to fall.

An external model costs £599, with the internal version retailing for £499. This price includes the SCSI interface, software, one 21Mb disc, cables and manuals. Extra discs cost £33 each or £150 for five.

IDE Hard Disc Upgrades
for the Archimedes & A3000

SPECIAL OFFER
A3000 Internal
Drives from
only £195

What is IDE?

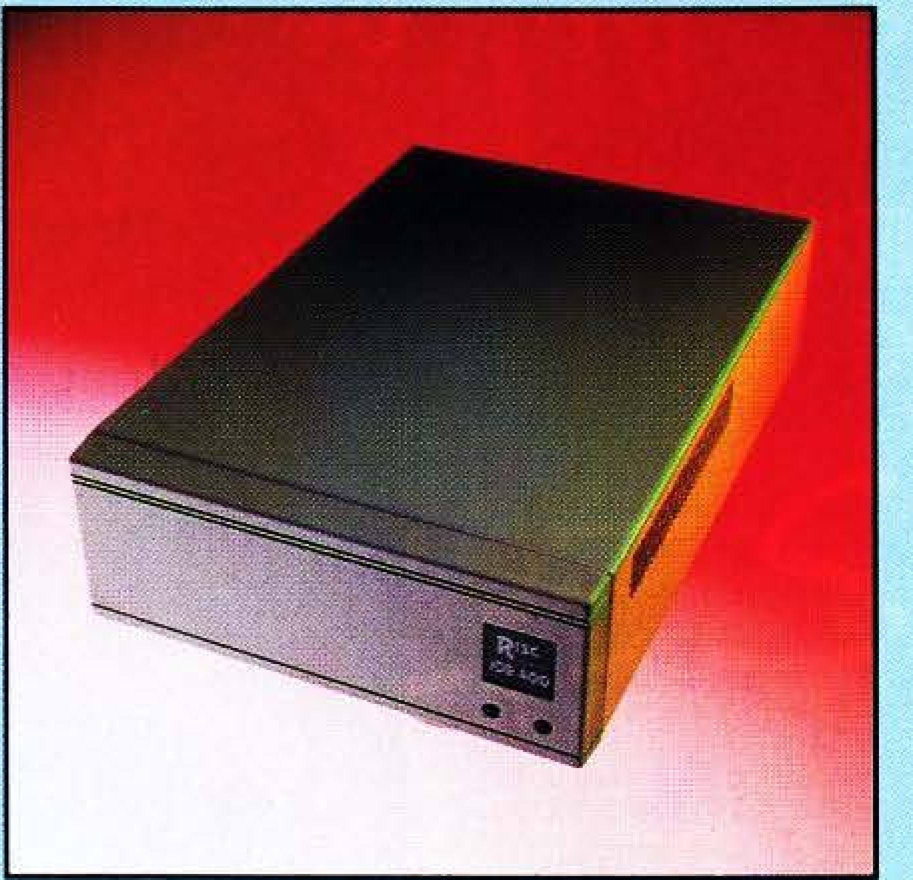
IDE (Integrated Drive Electronics) is the latest interface standard for connecting hard drives to personal computers and is used in the new Acorn A5000. Our drives all feature a memory cache system, which when coupled with our custom designed 16 bit interface give very fast access times indeed. Typically 50% faster than the Acorn ST506 drives used on the 300 & 400/1 ranges.

What drive options are available?
Archimedes 310, 440, 400/1 and 540.

Drive sizes currently available are 42, 89 and 105 Mbyte with a typical access time of 28ms for the 42Mb models and less than 20ms for the others.
These 3.5" drives are available as either internal or external units, and use our high speed 16 bit IDE interface card that fits in your podule backplane. External drives are attractively cased to match the computer and have their own internal power supply and fan. One interface card may be used to control both an internal and an external drive.

A3000

Our A3000 external solutions consist of the 16 bit IDE podule in a special metal podule box which fits to the back of your A3000 (under the monitor stand). Drive sizes are 42 Mb, 89 Mb or 105 Mb. We are also able to offer internal IDE drives for the A3000 that fit into the internal podule slot. These special 2.5" drives are available in 20, 42 and 89 Mb formats and have access times of 23ms.



Hard Cards

These are 2.5 inch hard drives mounted onto our 16-bit interface card for fitting into a standard podule slot in a 310, 400 or 540 computer. They are particularly useful when you already have one internal hard drive and want to fit a second.

What does the future hold?

IDE is a relatively new interface standard, but has already gained massive support. It has been endorsed by Acorn in the A5000 and is clearly the way ahead for users of Acorn systems. The next few months will see drives up to 400Mbyte, with larger capacities, and devices such as tape-streamers following very soon. The future for IDE is very bright indeed.

Quality

You may have total confidence in our products. Only the best drives from recognised manufacturers are used, Conner, Seagate, NEC etc. All drive kits are supplied with full fitting instructions and a user guide to ensure that you will have no problems at all. Our interface conforms fully with Acorn's IDEFS specification.

Money Back Guarantee

If for any reason you are dissatisfied with one of these products we offer a full 14 days money back no quibble guarantee.

	Internal		*External*	
Description	***Stock Code***	***Price***	***Stock Code***	***Price***
Archimedes 20Mb	*5250*	*£149.00*	*N/A*	------
Archimedes 42 Mb	*5251*	*£259.00*	*5261*	*£349.00*
Archimedes 89 Mb	*5252*	*£379.00*	*5262*	*£469.00*
Archimedes 105 Mb	*5253*	*£459.00*	*5263*	*£549.00*
Hard Card 20 Mb	*5290*	*£199.00*		
Hard Card 42 Mb	*5291*	*£399.00*		
Hard Card 89 Mb	*5292*	*£695.00*		
A3000 20 Mb	*5270*	*£195.00*	*N/A*	------
A3000 42 Mb	*5271*	*£399.00*	*5281*	*£359.00*
A3000 89 Mb	*5272*	*£695.00*	*5282*	*£479.00*
A3000 105 Mb	*N/A*	------	*5283*	*£559.00*

All prices include High Speed IDE Drive Interface, Manual & Fitting Instructions.

All prices are Ex VAT

Available from your local dealer, or directly from RISC Developments (please add £9 carriage).

RISC
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As near as damn

Ricky Delarre explores the new frontier of Virtual Reality

WHAT is reality? Philosophers will argue forever over that. One dictionary defines *real* as *genuine, true; authentic.* You could extend this definition to cover reality. But within the frame of human existence there are very few concepts which can be firmly and indisputably placed under this heading.

Let's face it, what's real to me may not be real to you. To a computer designer the movement of electricity within chips and circuits is a very real concept, but to a computer user it means little or nothing.

These two people, the designer and the user, couldn't have a sensible conversation about how computers work because they do not have the same reality. Whenever we refer to the so-called *real world* perhaps we should stop to think of what it means, and how real or otherwise it might actually be.

The problem is that we all perceive reality through our physical senses and our personal interpretation of what they are telling us. Because we have to interpret our senses personally – as individuals – there can be no one single absolute reality for all of us.

Through our consciousness and our senses all we create are our own realities and this can cause a lot of confusion. So how can we speak of our physical reality being the one and only, definitive truth? We can't. But we do. We have to.

For thousands of years we have been transported in one way or another into alternate realities: Books, songs, poetry, films, music – the list is almost endless.

It is amazing to think that one of the first black and white films, entitled *The Arrival of the Train at the Station* actually caused members of the audience to leap out of their theatre seats to avoid being hit by the approaching train.

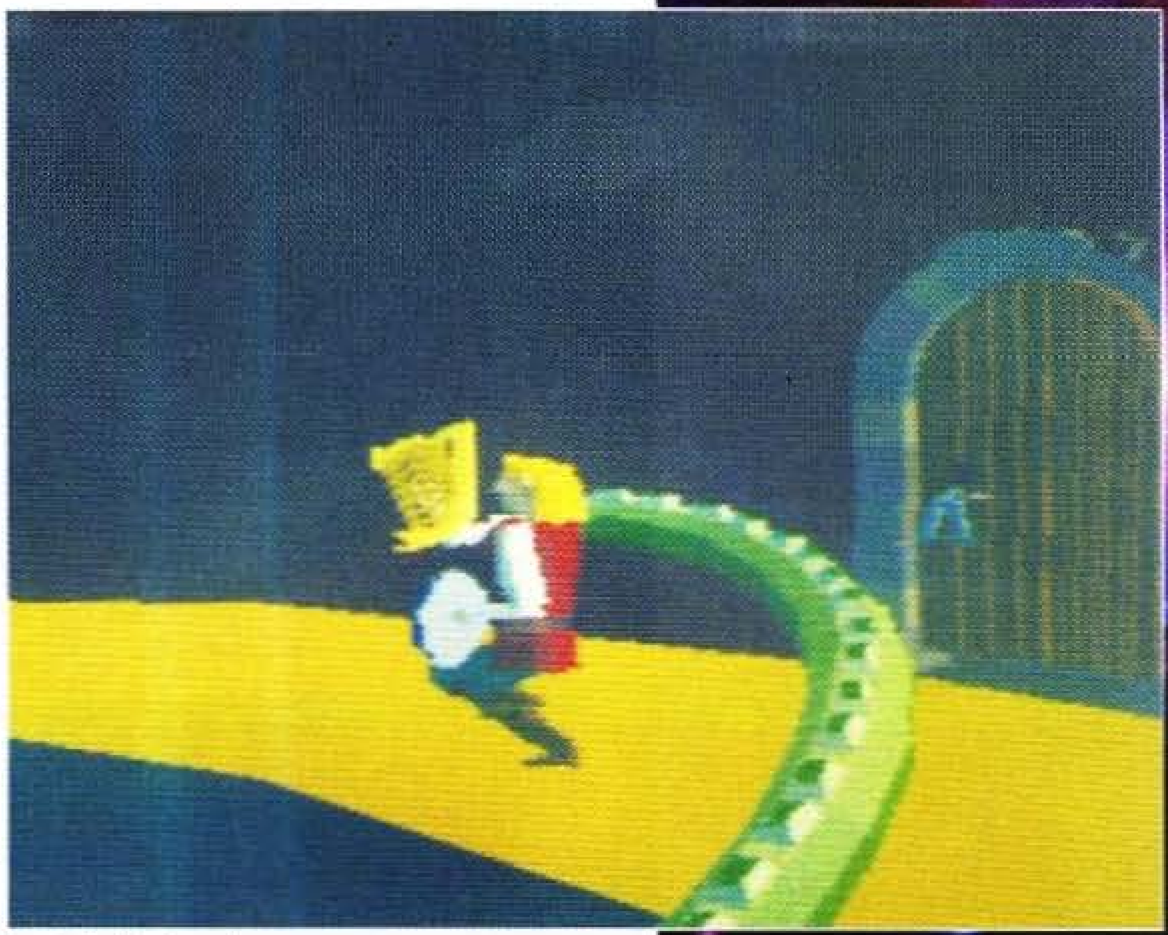
Nowadays we are far more accustomed to the experience of convincing alternate realities, and rarely notice the transition between the absolute reality of life and one created a film, a book or a piece of music.

As if this was not enough, computer systems are now being used to generate alternate realities, quite apart from our own physical one. By feeding our physical senses with stimuli designed to allow us to perceive a convincing alternate reality, we can be whisked away to wherever the software and its author wish to take us.

Cyberspace

Even the simplest of computer applications can be thought of as generating an alternate reality. Such a reality requires a space in which to exist. This space may not be physical, it may not even attempt to represent physical space. A Winchester disk directory structure, for example, is an area of cyberspace.

Such an area of cyberspace is almost non-existent in the real world, except for its protrusion into the physical plane in the form of arrays upon arrays of small magnetic particles on a disk, or billions of tiny electrons being directed about within a processor.



Look behind you!

The physical mass of an empty disk is exactly the same as that of a full one, despite the possibility that the full disk may contain huge areas of cyberspace. The cyberspace, then, barely exists in the physical plane of existence.

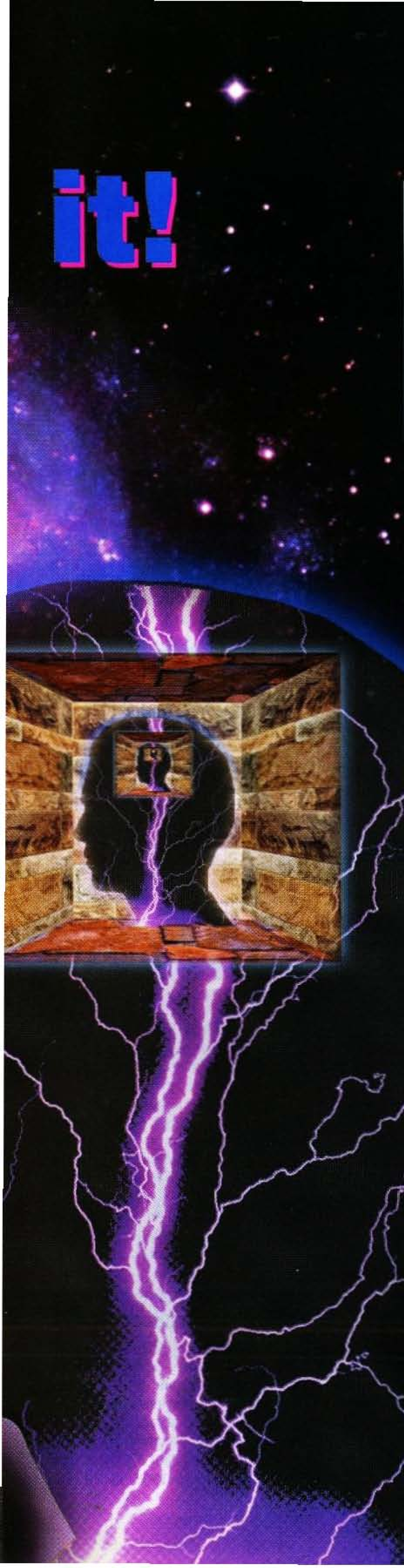
We are quite used to experiencing cyberspace as we use computers. When operating a machine which is running a fairly extensive operating system, we gradually build up pathways in our mind which we use to navigate the various facilities available to us.

As our familiarity with the system increases, we mentally build up a better picture of this space and learn to move around inside it with increasing efficiency. In doing this we are mapping the cyberspace in our own minds, in a similar way as we might on arrival in an unfamiliar town, where over a period of time, we become accustomed to the road layout, or, for the more intrepid, the public transport network.

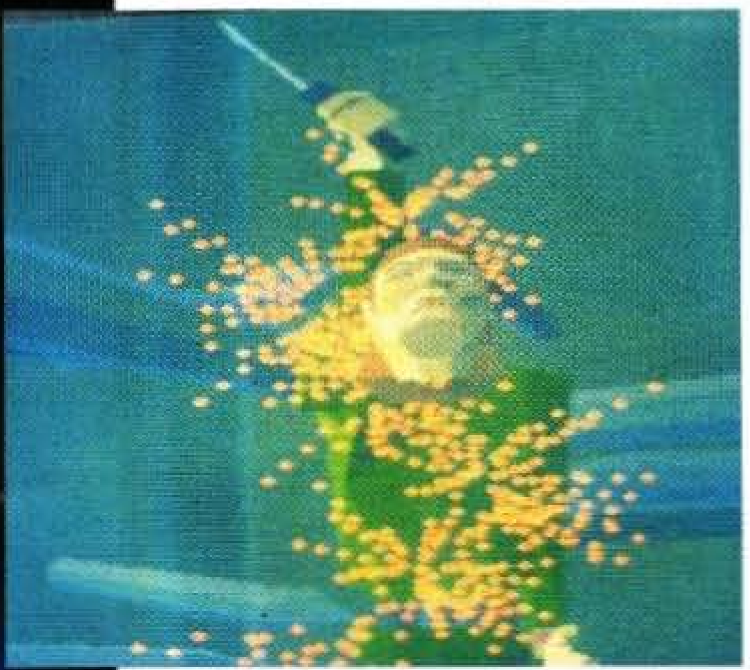
Taking another step-up consider the humble wordprocessor, that creates an illusion of paper with writing on it and we accept it completely. In effect the screen is the paper, at least on a *what you see is what you get*

It's good for your Elf

it!



Door to another world



Does it hurt?

system it is. The whole thrust of software development over the past eight years has been to create cyberspace that matches real space so that it's easy to get to grips with.

3D environment

Virtual Reality (VR) is another example of the human experience of – or existence within – cyberspace. For example, when a computer executes software which models an environment in three dimensions, an area of cyberspace is generated.

If the software has the capability to support the placement of objects within this space and is provided with a user interface to allow a human to view and manipulate the positioning or nature of such objects, it is presenting a virtual reality.

Over the last few years or so the subject of VR has received a lot of media attention, and with it the accompanying hype. It is now rather trendy to describe any 3D graphics product in terms of VR, and this label is being frantically applied by marketing men and writers alike. So let's work out a real definition.

This rush to leap aboard the virtual bandwagon has caused the definition of VR to be somewhat greyed but the best definition to date is probably: *...the creation of a highly interactive multimedia environment, in which the user participates with the computer in a virtually real world.*

Taking this definition apart, the word *interactive* means that the user can cause effects within the virtual world and things that happen in the virtual world can be perceived by the user.

Using the term multimedia implies more than one type of perception. In presentation packages it suggests use of still pictures, video, computer generated pictures, the written word, sounds and so on. Within a virtual world it would be computer generated graphics, sounds and other perceptions.

Standard three dimensional CAD packages can, therefore, be described as virtual reality generators but if they don't include more than vision then it's not VR. The presence of humans and other objects within this space could be thought of, rather interestingly, as the colonisation of cyberspace.

Data suits

Until fairly recently, humans have been regarded as just users of computers, and computers as tools of the human mind. This is fairly natural as the main uses for computers have been to perform tasks which were previously carried out by their human creators, but in a much faster, more flexible and more accurate way.

The user interface is a veneer existing between the user and the computer that makes the computer easier to use. The user would sit at a terminal of some kind, and interact with the computer in a rather disconnected way. The emerging sciences of cyberspace and virtual reality have begun to challenge this thinking.

The real crux of this change has been the shift from being outside the computer and looking in, to being inside and looking around. The difference is between *hands on* and *hands in*. This differentiation is most obviously represented by the nature of the user interfaces which are now being employed in VR systems.

Thus, the experience of VR has been greatly enhanced by the arrival of the data suit. This collection of devices is designed to feed into the computer, information about the wearer's actions and movements while simultaneously displaying the view and sound generated.

A data suit typically includes a helmet with two tiny television-style displays built in – one for each eye – called *eyephones* by NASA. More advanced helmets also carry small

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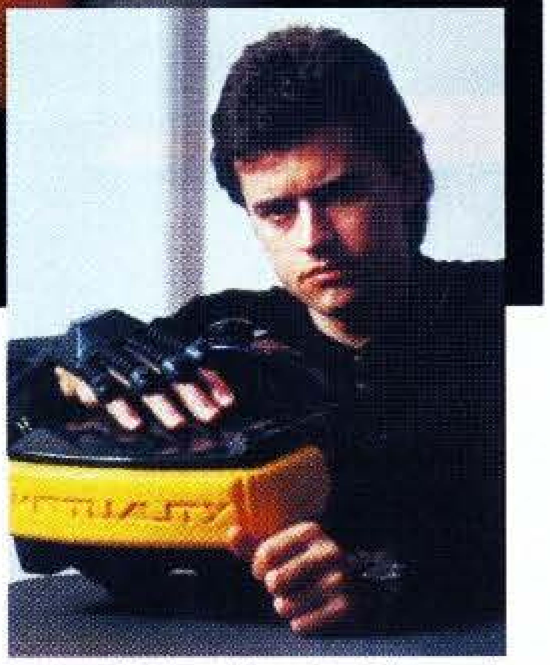
The Virtuality helmet

Into the fray

The drinks are on me



Dr Jon Waldern, Managing Director of W Industries – the Dream Merchant

speakers to provide high quality stereo sound, which would be processed by the computer in order to achieve a realistic effect.

The helmet is sensitive to movements of the head, and this information is fed back into the computer. The user may also be wearing data gloves that have many small sensors built into them to detect movement of the wrist, hand and fingers, and send the information back to the computer. An alternative to data gloves is a free-standing, joystick-style grip which when held, registers movement of the hands and arm and, of course, the trigger.

Once strapped into a data suit, you can move around relatively freely and the computer will be aware of all relevant actions. The data generated by the suit is fed into the computer and processed with reference to the current context of the virtual reality. For example, imagine a VR scenario which involves the user holding a weapon and engaging in a gun fight.

If the trigger finger is moved, the computer can detect this through the data glove and simulate the firing of the gun. Because the computer is aware of the player's position relative to the other people in cyberspace, a decision can be made as to whether anyone has been hit.

In a situation where a human – wearing a data suit with high resolution 3-D graphics and digital sound – is moving around in cyberspace, maybe playing tennis, performing some vital and intricate medical operation, or standing at a bar with virtual friends, the dividing line between computer and user begins to dissolve.

The main difficulty with data suits is feedback. When you pick up an egg you know when you've applied sufficient force because you feel the pressure on your fingers and thumb. For true VR there must be some way for the suit to tell you when you're touching something. Mechanical solutions exist but they make the suit very cumbersome.

Already, we are using VR systems in serious and useful ways. Perhaps the most obvious use is that of pilot training. The flight simulators used to train airline and fighter pilots alike are extremely sophisticated simulations which closely integrate both software and hardware. There can be little doubt that this is true VR, but it should be noted that these simulators do not rely on data suit technology.

Holodecks don't need data suits

Larry Niven, in his book *Dream Park* presented a recreational facility composed of holographic projections and there's an organisation in the USA trying to make it a reality. The problem is that when you hit a hologram, there's no resistance to your blow.

But it's in *Star Trek: The Next Generation* that we see the ultimate in technological Virtual Reality. The *holodecks* have no need for body suits as distant objects are simply displayed as projections while closer ones are generated as physical objects that you can see, hear, smell, touch or taste.

It's still only a dream, but if you can dream it you can make it – eventually.

NASA uses detailed and powerful simulations of the physical space in our solar system when calculating the trajectory of space craft and probes, before a single rivet is fired.

Architecture creates another useful application of virtual reality systems. Buildings would benefit greatly from being able to be experienced by those who design them – and those who live and work in them – before a single foundation has been dug.

Already it is possible for customers in Japan to try out a new kitchen, complete with appliances, before they commit to purchase. They can check that there is sufficient clearance to open and close doors, and can even benefit from a simulation of the thermodynamics involved in order to plan an energy-efficient environment.

In the arcade

Last summer a VR arcade was opened in London's Piccadilly. The Trocadero Centre houses four machines which run games such as a Harrier Air Battle, and an Off-shore Powerboat Race. The effect is incredibly realistic and the management of that arcade tend to refer to their systems as experiences rather than games.

The machines are linked up to provide the ability to play against real opponents, and include digital sound. They are designed by W Industries, a leading company in the field of VR entertainment. One of this company's products purchased by Legend Quest in Nottingham, is an adventure-game style system for multiple players. The full range of VR techniques are used, even stereo sound which is attenuated according to the distance of the source.

The home computer software market is not without its VR products. On most currently available home computers **Elite** can be run. This 3-D shoot-'em-up, released in the early 80s, was one of the first products available for home computers which generated a 3-D cyberspace in which the player could move around with a large degree of freedom.

Mainly owing to the limitations of the target computer, the cyberspace generated by Elite was not particularly large or detailed, but it had most of the characteristics of virtual worlds. Naturally, the user interacted with the computer through conventional means: The VDU, keyboard and joystick. But the imagination of the player was often sufficient to transport him or her into the realm of fantasy.

Another product released around this time was **Aviator**, a flight simulator which generated a far more realistic 3-D cyberspace, in which the player flew his or her aeroplane. Although rather less exciting than Elite, it offered a greater level of realism, as the aerodynamics and flying characteristics of the plane were modelled with high accuracy. As in Elite's case, Aviator was aimed at the BBC Micro and so was rather limited in its performance.

The Archimedes has enabled far more impressive virtual realities to be experienced by their owners. **Interdictor** and **Chocks Away** are fairly accurate flight simulators and they both generate significantly larger and more detailed cyberspaces.

Recently, a cyberspace design program was converted to Archimedes format and launched by Domark. The **3D Construction Kit** enables the user to place objects within cyberspace generated by the application, edit and move them around, and finally create a game so that others can enter the virtual world.

Power processing

The advance of VR systems is directly dependent on the hardware available to computer designers and engineers. As processor power and memory size increases, the potential of the computer will grow. It can be a shock to realise that 15 years ago personal computers could be

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Enjoying a game at Legend Quest

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expected to have around 1k of memory, no graphics to speak of, and a price tag equivalent in real terms to an BBC A3000.

As the hardware develops and improves, more and more power will be available to programmers of VR systems. But what of the software techniques involved?

The programming of VR is best done in a way closely modelling the reality which it is intended to create. If a programmer wishes to write software which generates a space within which things happen in a real way, he must try to steer as close as possible to real concepts, and avoid cutting any corners.

For example, a program which draws a given view as seen through a window can be achieved in many ways. The two extremes are a 3-D model tied into proper perspective projection, or a series of plotting commands designed to reproduce the desired picture.

On the surface, the result of running the two programs is the same, they both draw the same picture. The distinction becomes obvious when it is necessary to look from a different angle, or from outside the window inwards. Obviously the direct approach – involving the plotting commands – will not be able to produce any view other than the one it was designed for.

But, hopefully, the other method can deal with the change in requirements because it is modelling the reality of the situation. These two extremes indicate the diversity of approaches open to programmers of VR systems.

Even within the confines of the implementation of a three dimensional model, the programmer is faced with many design decisions, where the choices made will inevitably direct the resultant software closer or further from the goal of presenting a reality. Therefore it seems reasonable that, as the subject of VR matures and evolves so will the methods used to implement the software systems.

Reality is modelled within a computer program using the same theories that mathematicians have employed for thousands of years. These mathematicians have developed and used numerical systems and methods of calculation to model the real world, not in a computer system but on paper – in theory. The computer revolution allows the porting of these methods into a new realm where the results are much easier for the lay-person to experience and understand.

Into the future

So what of the future? The evolution of VR systems will spur many uses, both practical and recreational. Imagine a patient who is terrified of heights arriving at a doctor's surgery for therapy. Instead of the traditional, *lie on the couch and ramble on* approach, the doctor asks that the patient put on a data suit.

Friend or foe?

On this visit, the doctor instructs the computer that the patient is to experience modest altitudes perhaps starting with just a few metres, say. The patient can climb up virtual ladders, or sit on virtual window ledges.

On subsequent visits, the patient can be introduced to progressively more daring heights, maybe the top of an office block, or high up in an aeroplane. He would know throughout his treatment that he undertakes absolutely no bodily risk and could, in time, learn to overcome his phobia. It is not difficult to extend this example to fear of just about anything: Dogs, people, money, journalists, computers, doctors or even VR systems.

One of my personal favourite scenarios for VR systems is the public cyberspace. I see a vast potential for cyberspaces which are open to any person wishing to enter them. These could bring together people from across the globe.

A taste of this has already been experienced in the form of multi-user adventure games where people from all over the globe join in a single fantasy world. Here they can talk to one another, engage in games and form relationships.

We may end up being spectators of virtual football matches, obviously sitting in a virtual stadium. I wonder how long it will be before we can ride aboard virtual British Rail trains, although this would be particularly tough to simulate realistically, as the designers would need a great deal of imagination if they wanted to develop the full potential of the real experience.

Virtual Reality is likely to pose greater and more profound questions about the nature of human existence than we have faced to date, and it has within its scope the power to help answer a few such issues too.

There can be little doubt that the science of VR is here to stay. Although still in its infancy, it is destined to provide ever greater experiences, which are limited only by our imaginations and those of the designers.

As the cost of the technology falls, progressively more of the general public will have access to the experience, and it will become an integral part of our everyday lives, just like computers, television, radio, telephones, electric light, the printed word, shops or fire.

Social consequences of Virtual Reality

Recreational Virtual Realities are currently very limited but as the cost of technology falls and availability increases, more and more people will have access to it.

The quest for better feedback will certainly aim at direct stimulation of nerve endings, but at what point do you stop increasing the virtual pressure because it becomes pain? And if the system is by-passed could there be actual murder in a virtual world?

While at present VR is used to create fantasy worlds there's no reason why different versions of the existing world couldn't appear, with just enough changes to make it more the way you want it to be. In which case perhaps that's where you'd prefer to be all the time?

Then again, in a VR there's no distinction between race, sex or even species, because you tell the computer how you wish to appear. You could not know, in a public cyberspace, whether the dog beside you was a piece of scenery created by the computer or a real person in the guise of a dog. Trans-world conferencing is another business option for virtual realities, bringing businessmen together.

But it's a proven fact that taller people get what they want and it's better to be male, so what's to stop one person exaggerating their physique or even changing sex?

One episode of the television science fiction series Star Trek: The Next Generation revolves around a character who is obsessed by his fantasy world created on the holodecks – he prefers his invention to the real world.

Though the holodecks present a virtual world almost indistinguishable from the real world and that might be considered a factor, even today people become hooked on multi-user games and can live just for their next fix.

As usual it's impossible to legislate for the whims of humanity but the effects of VR will be even more fundamental and far-reaching than television. And, if the reality is convincing enough, what of the person who is struck by a virtual train?

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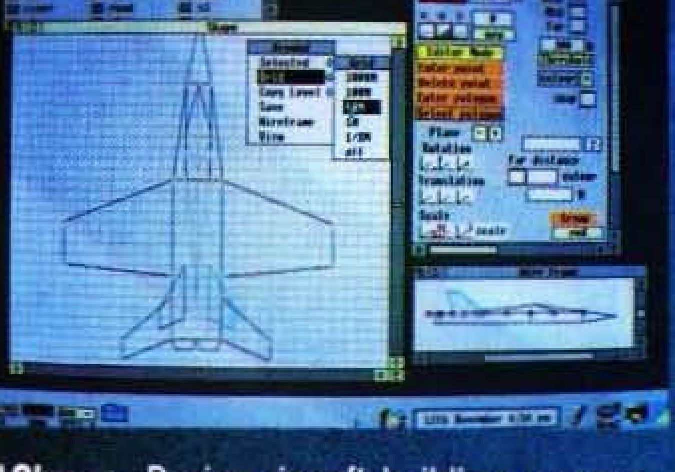

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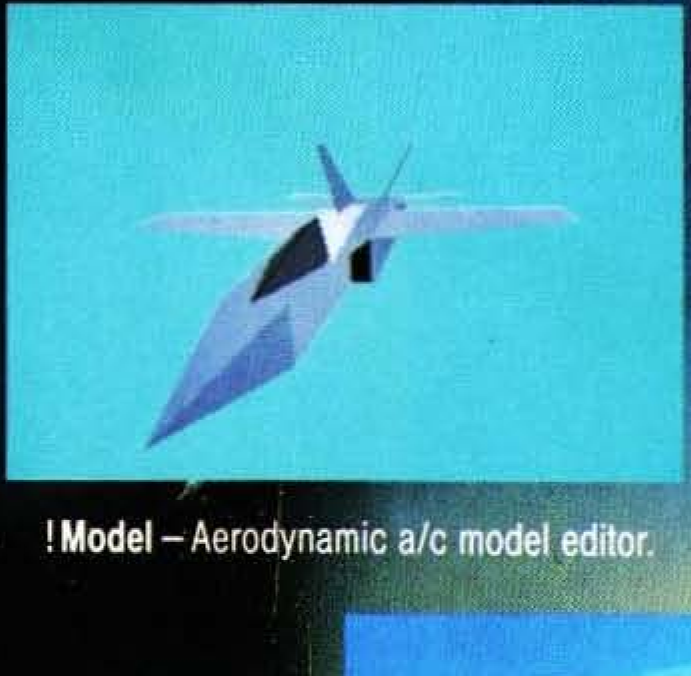

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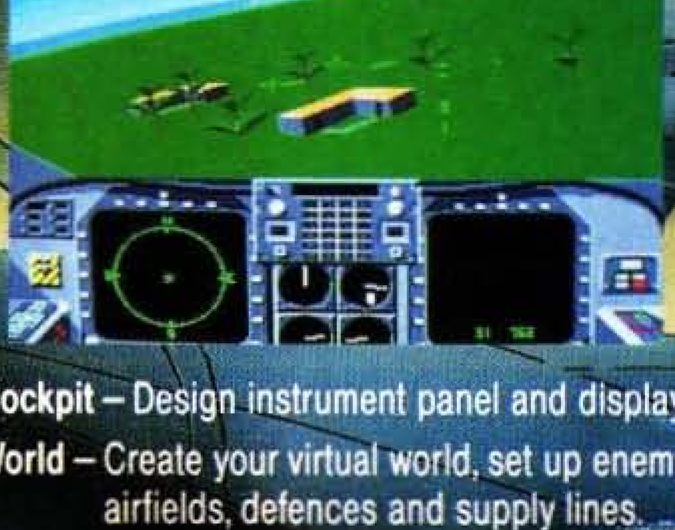

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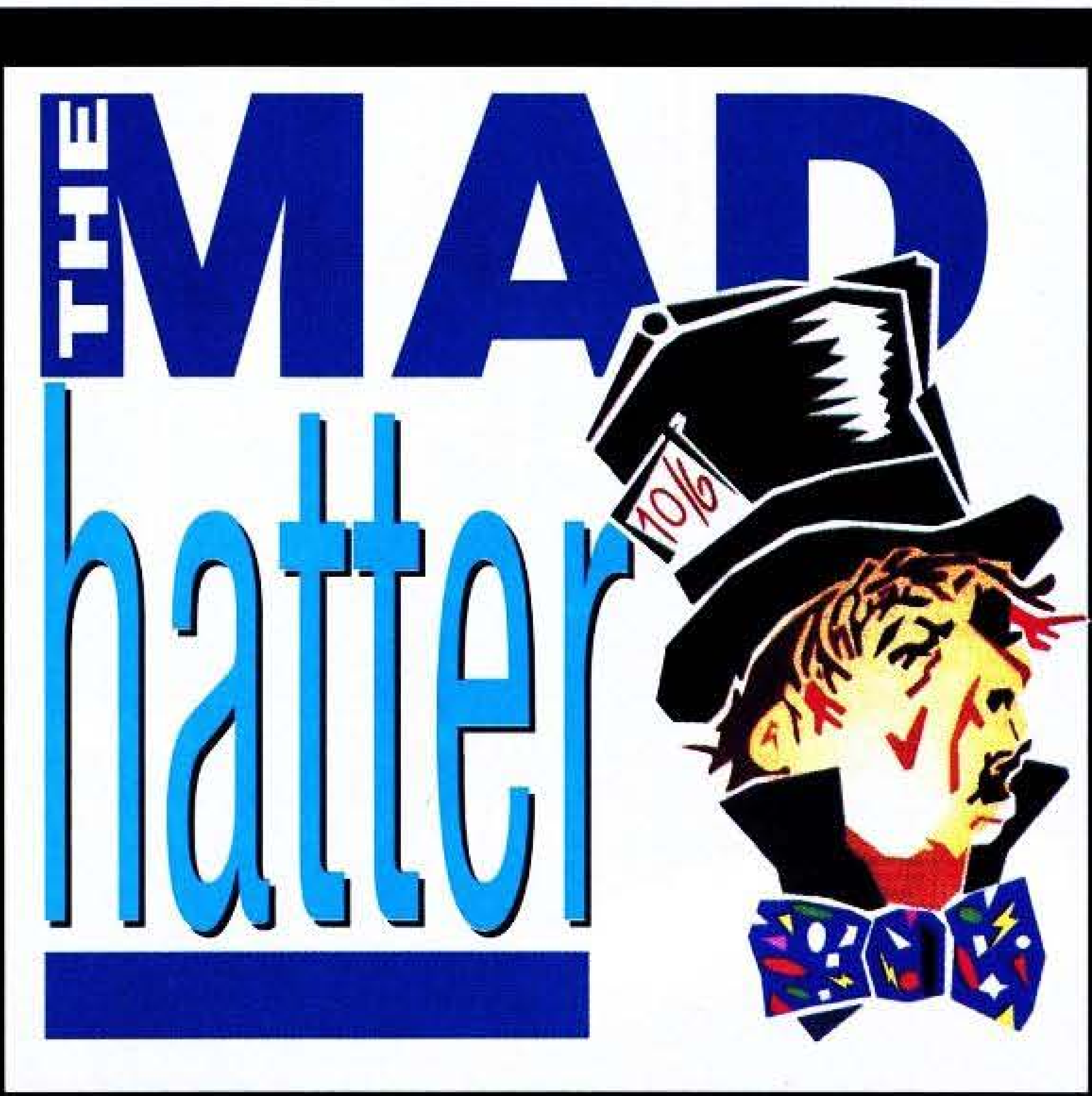

Hot stuff

LAST month I left you just after we had discovered an egg in *Adventure Quest*. Check your inventory, because you need certain items – the rest can be discarded now. Essential equipment consists of the Medallion, the Earth-stone, the egg, the lamp and the sword.

One move west from the round smooth cave – previously inhabited by the dragon – takes you to the edge of a volcanic crater. A spiral path will lead you down it, but you risk getting roasted unless you time your moves carefully.

The easiest way of doing things is to wait until the flames are described as leaping to the northeast and southwest when you are one move down into the crater. You can then move down once more, after which you should pause. This early adventure doesn't have the *Wait* command, so use *Look* instead.

You can then move carefully down into the crater until you reach the Cloak of Insulation. You have a choice here: If your hands are full, continue down to the bottom of the crater and store what you are carrying just inside the cave there (that can include the lamp, since the flames illuminate both crater and cave).

After that, it is a question of going back for the cloak, timing your moves just as carefully, before retracing your steps to the top of the crater to collect the rest of your equipment. Personally, I would advise taking the cloak and leaving something – the cloak renders you fireproof and thus you don't have to watch your step to the same degree.

It's important to realise that you can't avoid retracing your steps in order to get everything you need safely to the bottom of the crater. That's the whole point of this particular puzzle. I would also advise making use of a temporary save after each successful move if you are at all unsure of yourself.

The cloak is absolutely vital to the successful completion of the next area of **Adventure Quest** (the Hell-well) and again, you will have to retrace your steps in order to get everything to the bottom. Once you are absolutely sure that you have everything you need you can go west.

Now throw the cloak on to the hot coals – from which you cannot retrieve it. So if you suddenly find that you have left something essential at the top of the Hell-well – or even at the top of the crater – you might as well quit and return to a previously saved position.

That's why I advocate a carefully thought out policy of saves throughout your progress into an adventure. Personally, I have two types of save file: A permanent one for when I am certain that I have successfully completed a stage in a game, and a temporary one – or more than one – for use when I am doing something dangerous.

Let's use the crater and Hell-well as an example so that beginners to adventuring can see what I am driving at. At the top of the crater, once we have defeated the dragon we need a permanent save – the one before that would be at the entrance to the cave system where the spider's web was.

On the journey down the crater I have recommended saving each time a successful move is made until you reach the bottom and possess the cloak. I would then recommend a series of saves as you penetrate the Hell-well until you are sure that you are where you need to be with everything you need – for reasons which will soon become obvious.

I can assure you that if you get the sequence of moves wrong in the next stage of the adventure, you'll certainly wish that you had taken my advice. Take the egg west on to the hot coals and then south to the location of the nest and drop it there. Fire being its reproductive element, the Phoenix – your essential companion – will now be born and will follow you for the rest of the game.

Next, make absolutely sure that you have the Medallion, the Earth-stone and the sword before going north back to the hot coals. After that, you need to move west four times and then up. Take the Sun-stone and return east to the bridge.

Pete Austin has certainly read his Tolkein: So you'll find a reception committee – consisting of one belligerent blazing Balrog – awaiting you with anticipation.

At this stage of the adventure make a final check of your inventory, because you are about to make a one-way trip: If you've got any sense, you'll also save your position, just in case.

Smite the bridge with the sword *a la Gandalf at Khazad Dum* and down you will fall. Prepare to change character. Pete's also read his Lewis Carrol: So, instead of hitting the bottom at terminal velocity, or falling for endless ages as Gandalf did, you will land softly, not upon a heap of leaves, but on to a bleak moor. And there we'll leave things for now.

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COMMANDER
JAMES JAMESON

For one reason and another, I was not able to play my Archimedes **Elite** very much in the weeks before Christmas. However, I'm now making up for lost time and can offer a few observations – and the letters are starting to flow in steadily, too.

First and foremost, I strongly recommend that you upgrade to the **Elite Gold Edition** with its DataCards and enhanced keyboard strip.

Second, I am going to run a little competition: You've probably heard of the Paris-Dakar rally for cars. Well, in Elite you can join Gecko enthusiasts on the Arries-Diquer Rally.

The competition will be won by the reader who can chart the shortest route. I shall need full details of jumps and distances, and these will be checked by one of the authors, Clive Gringras. The prize will be a Special Edition sweatshirt inscribed with your name (up to 20 characters).

I don't expect to be able to announce the winner until towards the end of the year, so there's no need to panic: Make the competition part of your general enjoyment of ArcElite.

Now to other details: I found that I needed to use the keyboard to dock successfully until I got a Docking Computer. My younger son, however, took a tip from watching other craft dock – he ambled up gently to the space station and then accelerated rapidly as the letter-box approached the horizontal. Don't forget, too, that high-tech planets provide a rent-a-dock facility – this will eat into your profits, though.

If you are totally desperate, send me a disc and the return postage and I will equip you with a Docking Computer.

Now to other matters: Some readers have been puzzled by the two screen messages that appear congratulating your shooting ability. They work as follows: *Good shooting Commander* is awarded for every 50 kill-units, *Right on Commander* follows the tradition of being awarded for every 256 kill-units.

Notice the term kill-unit: You get some credit for blasting an asteroid, but you'll take years to get Elite that way. Your proper path to progress is via combat – and the combat situations vary in their difficulty, and so vary in the number of kill-units awarded.

Those readers who have upgraded from the 8-bit BBC Micro versions will also notice something else: You stay Harmless a lot longer. The BBC Micro version upgraded you to Mostly Harmless after eight kills, ArcElite is a much more exacting taskmaster and you are really going to earn that Elite status through hard work and clean living.

Commander Kryten has been a naughty lad: He's been picking up Space Beacons. These show up blue on the radar, as do cargo canisters, but are usually arranged in patterns – and are brightly coloured, rather like the cargo-boxes containing luxuries.

Now sit up and take note, dear reader: If you scoop up Space Beacons they will not show as cargo – but they *will* occupy space in your cargo hold. Further more, the only way to eject them is to scoop up a matching amount of cargo and then eject that. You'll then lose one Space Beacon for every ton of cargo ejected. Moral: If you've scooped up 35 Space Beacons you're doomed.

I have had a number of enquiries about Yaw Boosters: People want to know where they can be bought. The answer is – nowhere. Oh yes, they exist alright, but they can't be bought – they come as a reward for one of the Missions – and that's all I'm going to say.

If you want some combat experience, I can recommend snooping – though, if I were you, I'd wait until you are Mostly Harmless or Poor, and even then do choose your system carefully.

Snooping is when you use your fuel scoops and skim the surface of a sun to refuel. The point is that many pirates lurk around suns waiting for some hapless victim who is too poor to afford the fuel costs at a Space Station. You can imitate that hapless victim and have a real ball, believe me.

● *Next time, I'm going to deal with more readers' letters on ArcElite. Until then, happy voyaging.*

Lakes and larceny

I left you at the Temple in **Castle Blackstar** after you had dropped your goodies, so it's time for a further foray. Moves required are as follows: Exit, south, north, southwest, west – three times – and then enter the kitchen. Now you need to take the bottle and examine it to discover that it contains a heat resistant liquid.

Now go west twice more and then light the lamp so that you can go down to the picture gallery. Examine and then take the painting before going back up: Don't forget to switch off the lamp. Three further moves up will bring you to the Duke's bedroom.

If you examine the mirror that you will find here, you will get the following message: *A friendly face stares at you.* If you remember the message you found at the North Lodge, you'll be able to enter somewhere new. This is my moment – I love it – to be rotten. Say: *the correct word* which, in elvish, is *Mellon*, look and enter.

You will now need to light the lamp to discover that you are at the top of a secret passage with a low roof. Push the roof so that you can move up and take the vane before going back down twice to the South Lodge. Don't forget to turn the lamp off when you no longer need it.

Barbara Gibb now says that the description of the lake here is similar to the one given at the North Lodge *but* this time you can get a clearer look by going down to an inlet – where you will find a boat. This just shows that, in adventure games, you should take nothing for granted.

Examining the boat will suggest that it's not all that safe, but take it nonetheless. Now go up twice and you'll find that, if you enter Exit, you are back in the Duke's bedroom. After that go down thrice and north twice and – if all has gone well – you will be at the entrance to the North Tower. Moving up three times will bring you to the Mirror Room, where you should find and take a ring.

Unfortunately, you will not be allowed to remove the ring from the tower via the stairs: Another route has to be found. It just so happens, however, (clever adventure, this) that the mirror in this room looks just like the one in the Duke's bedroom. So – if you say the right code word – you can enter it and find another secret passage. From there you are able to move down twice and then south to the lakeside.

You will remember that, in order to get aboard the leaky boat, you must *Sail*. You then move east to the flames and southeast will get you to an island and safety just before the boat sinks. Here you can bail out the boat and take the dynamite.

We now have a problem – and a nice delicate touch in this adventure. How do we get the dynamite safely through the flames? After all, explosives tend to go *bang* with fatal results. The answer lies in the bottle: Pouring the liquid will render the dynamite impervious to the heat from the flames.

After this you should go northeast twice to the oily cave where you can fill up the lamp with illuminating liquid. Now take the staff and then move northwest and north twice to a cove. Barbara doesn't actually say here, but I imagine that the boat might need bailing out from time to time.

You should now wear the ring and then go Northeast so that you find some dwarves at work. They will ignore you, so what you do is go east to the workface and take the nugget.

This will only be visible if you are wearing the ring. After that, west, southwest and southeast will bring you to one of two *M Doorways* to be found. And that is where I'll leave you for the moment.

You pose the questions, Mike Cook finds the solutions

On the agenda...

- Real-time clock problems
- Mouse connections
- RS232 handshaking
- Loss of colour
- Powering a Scart
- I^{2}C bus

The time of day

THE real-time clock on my computer is playing up. It keeps time and I have no trouble reading it, but recently I have been unable to set it either through Basic or using a SYS call. As well as this it resets to Mon, 18 Feb 1991.20:42:15 if I press Control+Break.

I did have some trouble with the I^{2}C body building kit – I had the earth and data leads swapped on the connecting cable – and as the clock and computer communicate through the I^{2}C bus I am wondering if I have permanently harmed my computer. The problem remains even when the I^{2}C kit is disconnected.

Could you please tell me what has gone wrong and how to fix it? – **Timothy Down, Prestatyn, Clwyd.**

● *First of all make sure that the battery is OK. If you haven't changed it for over a year it's about time you had a new one.*

It is possible that all that is wrong is that the real-time clock chip has the wrong numbers stored in its parameter ram. There are various ways of setting this.

However, perhaps the most thorough is to remove the battery overnight, refit it and then power up holding down the delete key.

If you don't want to leave it you can short out the 47uF capacitor across the real-time clock. One way to do this is to short out pins 8 and 4 of the clock chip itself – the PCF8583 – about three seconds short will be long enough. You don't have to remove the battery.

If you still have no luck you could try replacing this chip. My thanks to R. Herslop for some of this information.

Scart overload?

BODY Building October 1990 covered connecting the RGB from the BBC Micro to the Scart connector of a television. You had both pins – 8 function switching and 16 blanking/fast switching – connected to the 5v output on the BBC.

The Peritelevision Interface Standard and British Standard BS6552 says that pin 8 should be set from 0v to 2v – logic 0 – for normal television mode and from 9,5v to 12v – logic 1 – for external mode.

This means that on some televisions – mine is a Sony and works in this way – it will need from 9.5v to 12v to make the TV accept an external input. Setting it to 5v will have no effect and it will stay in the normal TV mode.

This is the same pin that a video recorder will set high – if you press the TV/VCR button on the handset – to make the television open-up the direct audio/video channel.

The same standard also says that pin 16 should be set from 0v to 0.4v – logic 0 – for no RGB input and from 1v to 3v – logic 1 – when you want to use the RGB input as well as setting pin 8 high. This means that you are applying 2v too much to this input for what it was designed for. – **P. Hopkins, Peterborough, Cambs.**

● *As I said in the article, many manufacturers have their own way of implementing the so-called standard Scart, as is usually the case with any standard. Although the specifications say 9.5v, many systems will in fact switch with just 5v. Try it and see. If not, you could try using a battery, which was my other solution.*

Also, don't worry about applying 2v

More I^{2}C Bus problems

WAY back in June I spent some time building your I^{2}C board but was unable to get it working despite hours of checking and re-checking the circuits. So I bunged the whole lot in a box and forgot it until now. But as I have just successfully written my first ramp to the analogue output I was anxious to let you know what went wrong.

To paraphrase your May article, the connections to the backplane are on Row C of the Din 41612 type C plug, clock pin 19 and data pin 20. You also said that if the plug was examined closely the pins could be seen marked. They were, but not to provide what was required.

What I assumed is that the plug – fixing the backplane into the main board – when viewed from the rear of the machine is numbered from the right, 1 at the left and 32 at every alternative pin. That is how I made the connections soldering directly to where the plug wires bend over the top of the other row.

The podule sockets on the other hand, have numbers 32 etched on to the circuit board adjacent to the right hand side and 1 at the left. These numbers are not so apparent but it seems that they relate to how the interface should be wired.

I was unable to find 5 volts on the pin I thought you were referring to and now it seems that where I was trying to tap it from was pin 3 and not 30. I only found what was wrong by repeated prodding with a multimeter – one end struck in the Molex socket and the other roving the backplane while thinking that there must be a direct connection somewhere. I thought you might like to know. – **Christopher Bentham, Seaford, Sussex.**

● *I am glad you got the interface going and your solution might help others in a similar situation.*

The information on the connectors was taken from the plugs I use as well as from Acorn's own circuit diagrams. There are three rows of connectors a, b and c. The wires of the c row bend over on all the plugs I have, including the Acorn I/O podule.

However, it appears than you have a backplane where the wires bend from the a row. If you look very carefully you should see the row marks, but you might have to use a normal domestic electron microscope.

Mouse wanted

I AM using the printer and user ports of my BBC Micro for a project, but I want mouse-control as well but this requires a user port.

Is there any way I can use the 1MHz bus as the input/output ports for the hardware. My knowledge of the 1MHz bus is limited. The Advanced User Guide has a section on this but reveals little about the two parallel ports.

I know that FE60-FE63 are used for the printer and user ports, but what is the 1MHz bus equivalent? – **Stephen Youell, Sandy, Beds.**

● *The 1MHz bus is simply a space in the computer's memory map where you can place external devices. This space is divided into two pages of 256 bytes each, but to use this you have to add extra hardware.*

I have used this bus before in my Body Building projects, first in August '84 to add two VIAs to give four extra user ports and again in January '86 when I built a sound sampler which attached to the bus. Unfortunately these two project boards are now out of stock.

I have not used this bus more, because it generally makes a project expensive as it needs a double sided printed circuit board and uses the auxiliary power socket to power the board.

If you want more outputs, you can use the signals from the printer port. In addition, don't forget that the joystick fire buttons on the analogue input port can be used as either inputs or re-programmed as outputs.

If you still need more, you can get another eight inputs and outputs using my Serial User Port board from the February '90 issue of The Micro User.

Dealing with uncommunicative printers

AFTER an office refurbishment by the parent of one of our pupils, we have been presented with a PC compatible printer which we would like to use with our school Acorns.

It is a Genicom 3540 Quiet, which on its test print tells us it is an 18-pin, 9,600 baud serial printer with 400 characters per second in draft mode and no parity.

Its I/O panel has two twin-ax sockets of which the *out* can be fitted with a terminator plug. It came without a cable so the test lead I have tried using – not having invested in twin-ax plugs – has had mini crocodile clips which I have connected to the back of the sockets on the panel.

I would like to think I have tried all permutations of connecting the three essential wires of a serial lead and also with the terminator removed and the other two RS432 connections made, but seem to get no response.

We were wondering if you could give us some advice as to where we are failing to get the computer to talk to the printer, or even if it's possible. If it is possible, would you know if it emulates any of the more common printers? – **Brian Henning, Cumerland School, Canning Town.**

● *I can see no reason why the printer shouldn't work with your computer as long as you have both set up correctly.*

From the printout, it was not possible to see if the printer has been set up for 8 bits of data – the default for Acorn machines depends on what computer you have.

To set up an Acorn machine at 9600 baud with 8 bits and no parity you need to enter the following star commands:

```
*FX8,7
```

and

```
*FX156,18
```

Then to change to a serial printer you need to enter:

```
*FX5,2
```

*Next you need to see if the printer is receiving the information sent. To do this press Control+B and give a few *HELP commands – if you're really daring try:*

```
*HELP .
```

which will list every bit of help text in the machine. If the printer is not receiving this data the screen will eventually stop scrolling, this means that the handshaking needs attention.

RS232 handshaking is simple in theory, but the practice can be tricky due to the ambiguous nature of the standard. A good book on this is ***The RS232 Solution*** *by Joe Campbell published by Sybex ISBN 0-89588-140-3.*

There are so many different combinations that could apply and I would only repeat the whole of this book in my reply. I am not sure what you mean by a twin-ax, the standard serial printer uses a 25-way D-Type socket. However, in addition to the three signal leads you will also need an earth – pin 7.

It is unlikely that this printer would use the same control codes as Epsons – the standard in the BBC Micro world – but you never know. If you're using the printer with the 32-bit machines and standard Risc OS software you'll find an IBM option in the !PrinterDM application.

extra to pin 16. Providing the input voltage on a chip does not exceed the power supply of the chip no harm will be done. All logic chips run off 5v and most decent designs should be clamped to prevent excess voltages causing damage. I know that there are poorly designed systems out there, but you can't come to any harm feeding 5v into a Scart.

Loss of colour

I AM experiencing trouble with my BBC B issue 7. I have been using a black and white TV as a monitor, but after about 15 minutes I have to retune it as the images on the screen become distorted.

I have recently bought a Philips 1021 14ins portable colour television to act as my monitor. This works in colour mode for about 50 minutes, then it starts to switch intermittently between the colour and mono screen.

Five minutes later the screen is permanently black and white, and re-tuning has no effect. But if I turn the computer off for about 10 minutes and then turn on, the display will return to colour mode, but for only another five minutes. Switching the TV off makes no difference.

I have re-tuned the UHF modulator and after a lot of tweaking the colour display reappears, but not permanently. I have also connected the computer to two other colour sets – not portables – and they work fine.

The fault would seem to be the UHF output drifting due to rising temperature. The other television seems to be able to track the drifting UHF signal. Have you any ideas? – **Denis Fry, Hull, North Humberside.**

● *A colour signal consists of the luminance signal – this gives the black and white – and a chrominance signal – the colour. The latter is modulated at 4.433619MHz, known as the colour sub-carrier and derived from a 17.7345 MHz crystal on the Model B which gives 4.433625MHz.*

As you can see it is very close to, but not quite, the same frequency. A small burst of this signal is present just after each line sync pulse so that a phase lock loop in the TV set can synchronise to the exact frequency of the incoming signal. This is needed in order to demodulate the chrominance signal and recover the signal. If the TV set can't lock on to the sub-carrier, a colour killer circuit trips in and you get a black and white signal.

The colour generator in the Model B is rather crude, but will still work with most TV sets. I think what is happening is that your portable set is not so good at tracking the small variations that occur in the sub-carrier frequency and this is triggering the colour killer circuit.

The bigger sets seem to have a wider tracking range and can cope. Tuning a TV set alters the frequency of the incoming signal and allows it to be locked.

However, unfortunately the only cure would seem to be to increase the track range of the phase lock loop inside you colour TV set. Unfortunately, it's not every service engineer that could do that for you.

Degrees of warmth

WE ARE interested in connecting a temperature monitor to our BBC B. We have already purchased one device to give us serial output. However, this is 13 bits long (output) with each bit 1ms long. There is also a clock signal output which outputs in time with the data output.

We have been unable to connect the device via the RS234 directly and wondered whether we were missing something, or if the whole idea was flawed.

For the application – monitoring the temperature in incubators in classrooms – we only need the first 10 bits of information. But some way of getting the other three would be useful. Can you point us in the right directions? – **D. Burgogyne, Meanwood, Leeds.**

● *I have used this temperature monitor twice in my Body Building articles.*

In September 1989 I showed how to connect it to a Model B or Master through the user port, while in November '91 I looked at how to interface it to any computer using the serial user port.

Details of this and all other Body Building projects are available from Musbury Consultants as usual.

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EDUCATION Update

On the right track for special needs

FOLLOWING close on the heels of the Oldham Overlay Keyboard, NorthWest Semerc (061-627 4469) have just released their special needs trackerball, ArcTracker. This is a rugged piece of hardware aiming to help those with poor motor control or learning difficulties move the cursor/mouse pointer accurately around the screen.

Developed by Penny & Giles in conjunction with NorthWest Semerc, ArcTracker houses a trackerball or joystick and a number of specialist function keys – move the ball or stick and the cursor moves on screen.

Designed to replace the mouse on the 32-bit Acorn machines, the physical and conceptual complexity of controlled mouse operations can be simplified using the function keys. There is a double-click operation key, with another for dragging objects around the screen, as well as up, down, left and right – particularly useful for finding your way around menus.

A dial is situated on the side to allow you to determine the speed at which the cursor/pointer travels. ArcTracker is priced at £269 and comes with a removable plastic key guard template. This enables special needs users with poor motor control to rest their hands on the keyguard avoiding the frustration of unwanted key presses.

Cut it out

EXETER based DEC_dATA (0392 221702) have released a series of new clip art and resources collections for education, all priced at £4.95 each.

Columbus is a disc released for the 500th anniversary of Christopher Columbus reaching the Americas in 1492. Included with the clip art pictures of the man himself and other important characters, there are drawings of his three ships, navigational equipment, maps and so on. Most of the images are in colour and a file of teachers' notes contains information on each file and ideas for use in the classroom.

The next is called Extinct Animals. The clip art consists of a whole host of dinosaurs and other extinct species: Gallimimus, tyrannasaurus, triceratops, quagga and the moa bird. There is also a detailed stegasaurus skeleton as well as a detailed view of the leg bones of the diplodocus plus an ultrasaurus compared, for size, with a schoolgirl.

In addition, Flags of the World has been updated to contain the new Baltic states, the countries in the CIS as well as Croatia and Slovenia.

Kiddy Windows

INFANT Windows and Junior Windows were first launched in 1990 and were aimed at primary school Archimedes users. These two packages have now been updated, improved and extended. Both cost £20 each and are available from Porters at 138a Harvey Clough Road, Sheffield S8 8PG.

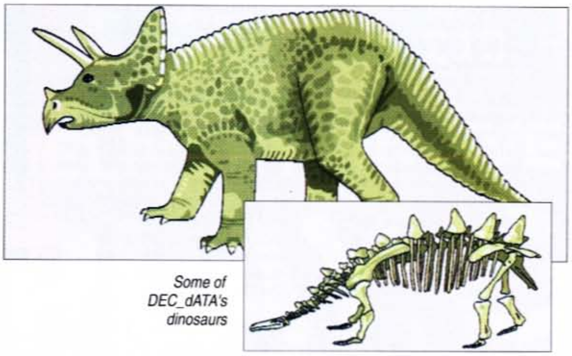
Infant Windows is a simple content free integrated text and graphics program which has been designed for children from five years upward. The aim is to familiarise them with the computer keyboard, the mouse and processes such as loading and saving files and printing documents.

It also introduces young children to word processing, simple computer drawing, painting and basic DTP. The end result is young users creating a story and picture on the computer screen and then producing the page which can be printed.

Infant Windows consists of two programs: One is designed for children able to write several sentences in normal screen sized text, while the second is for younger children. Here word processing takes place with large letters and finger spacing between the words.

These programs now come with the Filer and Wordbook utilities. Filer lets you display, load and delete files easily, with Wordbook helping you to build a list of words.

Junior Windows is the next stage on, encouraging children to create a newspaper with up to 30 different frames continuing pictures, text and headlines in various fonts. Frames can be moved, resized and shown with or without borders. In addition there is a scrollable 50 line story window and a useful utility for converting sprite files.



Some of DEC_dATA's dinosaurs

Star on the wire offers BBS support

STAR-NET (0603 54015) is a bulletin board which offers an Archimedes service. It is also the official Acorn Support BBS for East Anglia and functions as an Education Support BBS for schools and college attempting to find their way around on-line communications.

Teachers and pupils can use the system economically and there is also a database for pupils to extract information on a host of topics.

Last year Star-Net joined FidoNet and took the K12 series of echoes. These are 39 international channels on different educational topics for pupils and teachers including all major subject areas with 12 channels dedicated to co-operative projects between schools.

Developments have continued into 1992 with the foundation of SchoolNet UK.

This is a domestic version of K12 with connections so far established in Norwich, London, Lowestoft, Bristol and Bradford.

Keeping up

WITH the National Curriculum being updated with new statements of attainment in Maths and Science, NStore has been released in a new version too.

HS Software (0792 204519) have ensured that version 3.0 of NStore holds the records on English, Maths and Science from levels 1 to 10 for up to 432 children and 432 topics.

NStore is available for the BBC and Master for £19.95 and £29.95 for the Archimedes. Existing users can upgrade to the new version for £3.50.

Cambridge International Software (071-226 3340) have also modified their PIPP programs to give you the latest attainment targets at your fingertips.

Topics updated are: Maths, History, Geography, Music and Science. Primary PIPP2 costs £52 and you can update your PIPP2 for £15 or upgrade the original PIPP for £25.

PIPP is still being developed with project profiling due around Easter with personal profiling planned for the summer.

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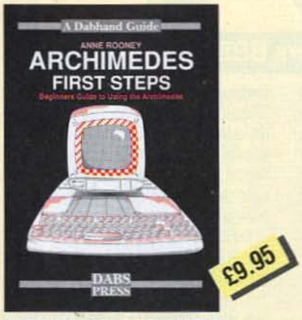
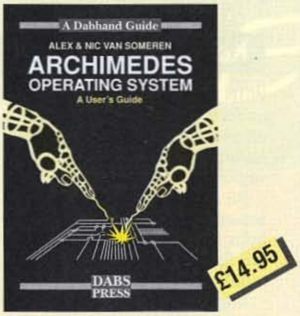
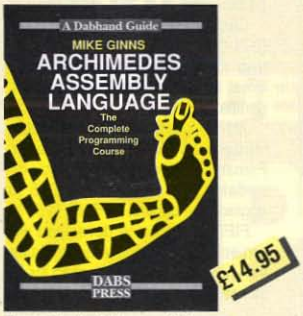


Introductory book for the Arc, covering the basic operations and use of !Edit, !Draw, etc.



Useful summary of OS information with detailed examples. (£21.95) with disc.



The only tutorial and reference on ARM assembler on the market, with many RISC OS examples. (£21.95 with disc.)

BBC SOFTWARE

Hyperdriver

The ultimate printer driver ROM, with over 80 commands, a built-in NLQ character set, WYSIWIG previewing, access from View, Wordwise, Interword or BASIC. 100 page manual. For B/B+/E/M/C. Price £29.95 ROM, £24.95 disc for SRAM.

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Master 512 Technical Guide

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Master 512 Shareware Collections

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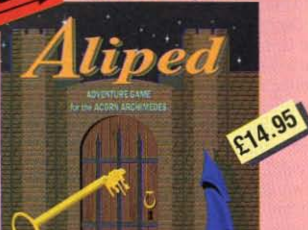

"Aliped - wing footed like a bat is the spell that has been put on you by the evil step-mother of your fair princess Natasha".
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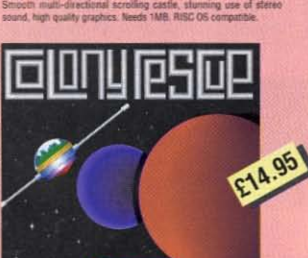

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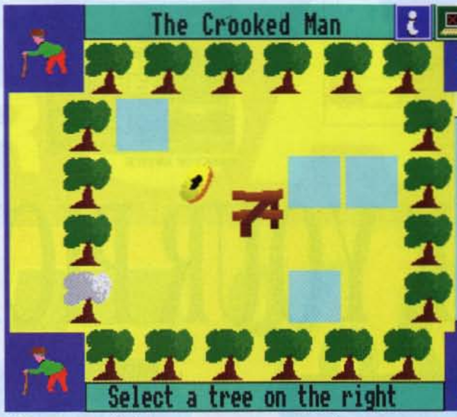
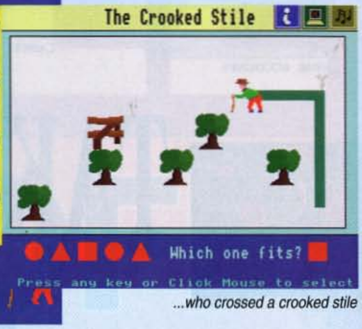
Product: Adventure Playground
Price: £19.95
Supplier: Storm Software, Beth House, Poyntington, Sherbourne, Dorset.
Tel: 0963 22469
Requirements: Risc OS

Ripe for a challenge, Frank Jukes steps out


The Crooked Man

Select a tree on the right

There was a crooked man


The Crooked Stile

Which one fits?

Press any key or Click Mouse to select

...who crossed a crooked stile

Fun exploration

CROOKED Adventure and Queen of Hearts are two exploration games for children between five and nine years of age and make up Adventure Playground from Storm Software.

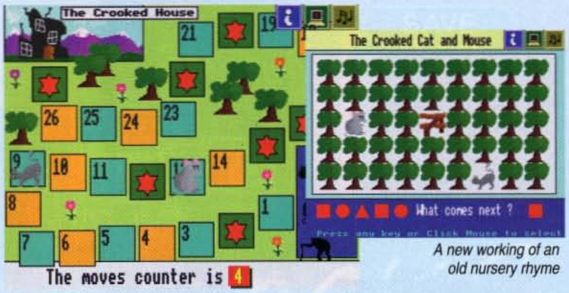
Crooked Adventure is the easier and simpler of the two programs and consists of four puzzles. The aim is to get the crooked man with his crooked cat and crooked mouse to their crooked house after finding a crooked stile and crooked sixpence. Glasses and keys may also be found along the way, the glasses helping to see things and the keys opening the door at the end of the game.

Starting out

In the first puzzle, The Crooked Stile, you are shown a set of shapes. Additional shapes are then displayed in turn and the shape which belongs to the set is selected by pressing any key or clicking the mouse. A correct choice allows the man to move towards the stile and also adds an obstacle to the screen in the shape of a tree. A wrong choice simply adds the tree.

The Crooked Sixpence is a puzzle in which secret colours must be revealed and matched. Four trees down the left side of the screen each have their own hidden colour and likewise four trees down the right side of the screen.

This adaptation of the game of pelmanism means that after each successful match an area of the field may be inspected for the crooked sixpence. If it is not found the secret colours are mixed up and the whole process must be repeated – you might find some keys here too.


The Crooked House

The moves counter is 4

The Crooked Cat and Mouse

What comes next ?

Press any key or Click Mouse to select

A new working of an old nursery rhyme

Puzzle it out

The third puzzle, The Crooked Cat and Mouse, is similar to the first, the aim being to choose the next shape in a sequence rather than completing a set. Correct choices allow a cat to chase and eventually catch a mouse.

The final puzzle is The Crooked House and it requires the man, cat and mouse to be moved along the crooked path to the house. This is done by stopping a counter at any number between one and six and then choosing a character to move.

Red stars on the path represent danger and landing on them returns the character to the start, as does one character landing on another. Completing the puzzle involves successive additions up to 28 and the development of a suitable strategy to avoid characters landing in the same place.

Once the fourth puzzle is completed, keys are tried in the door of the house to see if it can be opened and the game completed.

The screens for all four puzzles are clear and uncluttered with help and options to turn the music off or quit available by clicking on small icons at the top of the screen.

According to the user guide pressing Caps and Z together acts as an Escape key. It doesn't, there isn't a Caps key! Pressing Q with the Caps Lock light on is the way to quit as is clicking on the quit icon at the top of the screen.

Queen of Hearts is the harder and more complicated of the two programs. The explorer's task is to find the tarts stolen and hidden by the Knave of Hearts and then return them to the Queen in her palace.

Like many adventure programs it develops skills like planning, decision making and logical thinking, by presenting the explorer with the task of collecting useful objects from various locations. Unlike some similar adventures the problems and locations are scrambled each time the program is run.

Each location is illustrated by a pleasant picture in the centre of the screen as well as a simple tune. They include Mary's Garden, The Beanstalk, The Three Bears, Jack and Jill and Old King Cole. The pictures provide plenty to talk about and are a useful aid to language development.

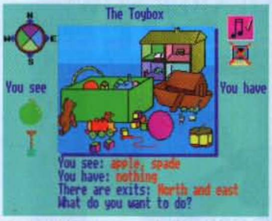
The tunes, on the other hand, are a disappointment. A good idea in principle, they are dreary and spoil the overall effect. Thank goodness they can be turned off. Though another stimulus for the child, if they could be replaced by something more substantial I would welcome their return.

Adventure and fun

Movement around the locations is achieved by either entering north, south, east or west at the keyboard – N, S, E or W would do – or by clicking over a compass at the top left of the screen. The clicking method is to be preferred but here lurks one of several bugs in the program.

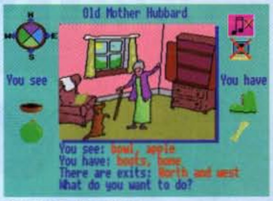
Young children are not the most

➤


The Toybox

You see: apple, spade
You have: nothing
There are exits: North and east
What do you want to do?

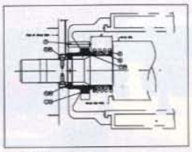
Queen of Hearts – you start from here


Old Mother Hubbard

You see: bowl, apple
You have: boots, bone
There are exits: North and west
What do you want to do?

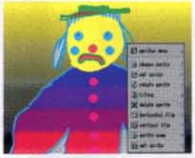
Good use of graphics

HOME ACCOUNTS



CADET

DESKTOP OFFICE



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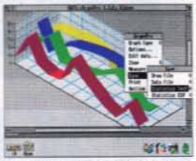
ATELIER

ANCESTRY

PRIMEART



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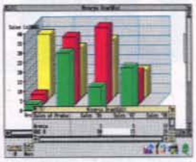
TIMETABLER

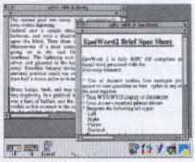


GRAPHBOX

System Delta+

SYSTEM DELTAPLUS

ATELIER


EasiWord2 Brief Spec Sheet

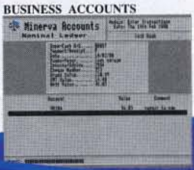
EASIWORD v2

Minerva Accounts
Sales Ledger

BUSINESS ACCOUNTS

FLEXIFILE

BUSINESS ACCOUNTS


Minerva Accounts
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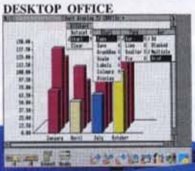

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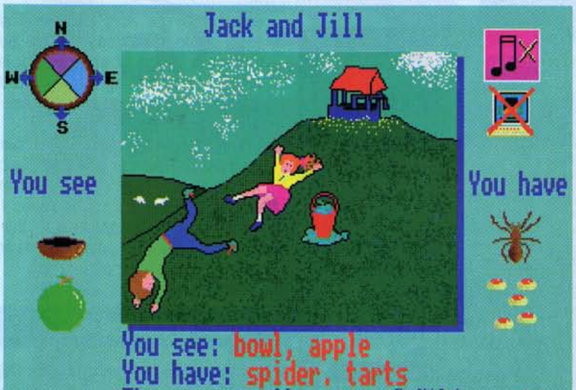
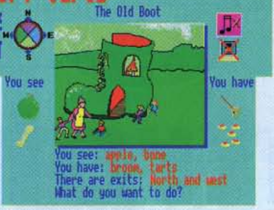


You see: bowl, apple
You have: spider, tarts
There are exit
What do you war

Can you deliver the tarts



You see: apple, bone
You have: broom, tarts
There are exits: North and west
What do you want to do?

You can only carry two things

➤

accurate of clickers and clicking near, but not over, the compass produces the previous move and not the one intended.

A similar bug afflicts the Quit icon at the top right of the screen. Clicking anywhere in this general area produces the option to quit. Clicking on No results in all text at the bottom of the screen and the useful objects for collection in that location disappearing.

The objects are scattered, two at a time, randomly around the locations. They are picked up and dropped by clicking on them but only two may be carried at any one time.

If one needs to be dropped in a location already occupied by two objects they must be swapped by typing Swap then the names of the objects. This is a pity. I would have preferred the adventure to have been completely accessible through the use of the mouse.

Overcoming hazards

From time to time various characters appear and block the way until a particular object can be provided. The Good Witch, for example, needs the broomstick to enable her to fly away. Move back over her location later, though, and she is still there despite a message to say that she has flown away.

The program checks for the explorer's honesty and will not accept mistakes. Old King Cole knows that you haven't really got his bowl no matter what you say. Unfortunately, a buglet places it next to him in the picture and displays items being carried in the position reserved for those to be collected.

The adventure can be mapped and I would recommend that one is drawn – it certainly helped me to remember where I could find the objects I needed and how I could get back to them.

Reading the prompts at the bottom of the screen could be a problem for the youngest of children but with an adult's help, and because the text is repetitive, the problems should not be insurmountable.

Summing up

Both Crooked Adventure and Queen of Hearts were first published in 1984 by Widgit Software. The programs were no doubt good in their time but the market has moved on and their transfer to the Archimedes seems to have been hurried or careless.

Neither program runs in a window, there are several bugs present, the user guide does not mention the mouse and it constantly refers to cassettes rather than discs. While the programs are not without their uses there are other more substantial programs at this level which I would prefer to use at school.

For home use, however, the package may be of value as an introduction to adventure games or as an alternative to the zap 'em and run type of game. The bug exterminator needs to pay a visit first though.

Going Logo

Rog Frost visits a new addition to an old friend

Product: Archimedes Control Logo
Price: £22
Supplier: Longman Logotron, Dales Brewery, Gwydir Street,
Cambridge CB1 2LJ.
Tel: 0223 425558
Requirements: Risc OS

THE old BBC Micro was renowned for its control potential, the 32-bit machines don't have the same reputation. But this package allows easy control of all sorts of electrical devices by the Archimedes range. It is merely the software and to make use of it, hardware will be needed as well.

For Archimedes computers an Input/Output expansion card is essential while A3000 users will need a user port expansion card. Such expansions can only handle very low current devices so, to drive most electrical items, an extra control box is also essential.

Gaining control

Control Logo was first designed for two lead control boxes which connect to the user port and printer port. Designed originally for the 8-bit BBC computers this may require an alteration to the printer port connector.

Other control boxes can also be used. Software commands are present in the program to allow for just about any possible style – the popular Lego control box or an enthusiast's home made box.

One further item is needed to complete the list of essential extras: Control Logo is an extension of Logotron Logo and will only work with the Logo program installed.

Control Logo is loaded as normal and after a few moments you are prompted for your Logo disc. After a title screen, the familiar blank Logo screen will be seen. Typing Help produces a list of the new commands which are now available.

In a review like this there is not the space to list them all, but they allow the measurement of external electric currents or sending signals to turn on devices. All commands are well explained in the instruction manual.

Anyone familiar with Logo will grasp the way these commands can be used with ease.

As with ordinary Logo, it is the ability to use commands close to real English which makes the system easy to use. For example, to turn on an external device such as a lamp, simply type TURNON. TURNOFF reverses the process. At this most basic level, Control Logo is really simple to use.

Of course, existing commands can be built into new ones as with ordinary Logo. For example, build the word FLASH by using the TURNON, PAUSE and TURNOFF commands.

Inputs are as easy to cope with. The IN? command is used to see if a device is switched on or off while ADVAL is used to measure voltages. Voltages may be created by light, temperature or position sensors. The ADVAL system may not be available with some A3000 user ports.

One of the big advances of the Archimedes version of this program is the SETPOWER command. This allows the speed of motors or the brightness of bulbs to be controlled with ease.

Other new Control Logo commands are for the more ambitious. There is a comprehensive set of logic commands – AND, OR, NOT and so on – as well as commands which allow the computer to take decisions such as WAITUNTIL a condition is met or IFTRUE do something.

Control enthusiasts tend to like systems where they can interact closely with their computer. So, this program will appeal most to school users.

The National Curriculum expects junior aged youngsters to use information technology to detect and measure environmental changes and to know something of logic.

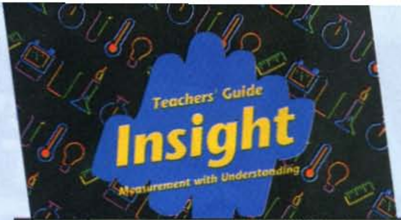
Summing up

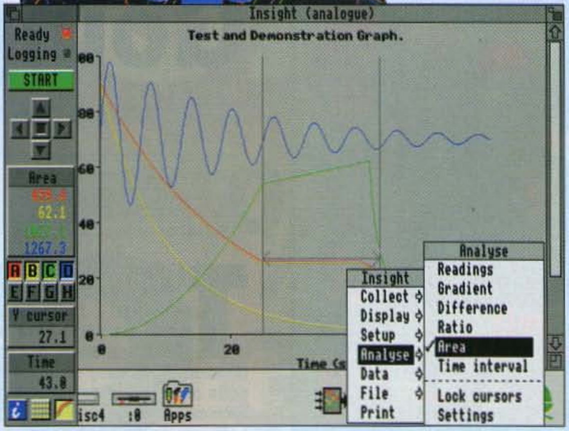
Control Logo provides a perfect environment for young users to cope with their needs, but has sufficient depth to provide challenges for GCSE level students and beyond. The program is comparatively inexpensive and with its basis being the familiar Logo style it can be thoroughly recommended.

Control testing

Can Insight make a lasting impression? Rog Frost investigates

Product: Insight
Price: £69
Supplier: Longman Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ.
Tel: 0223 425558
Requirements: Risc OS





Performing analogue measurements

AND to think just a week ago I was still saying that the old 8-bit BBC B or Master was the ideal tool for sensing and scientific measurement.

Well, that was in the dark days before I received a copy of Insight, the new graphing, analysing, measuring and recording pack. I am now a completely reformed character, firmly convinced that the Archimedes is the tool for the job.

There is one thing to get right straightaway. No matter how good the software, it will not measure anything unless you have the required sensors, which convert events, such as changing temperature, into electrical signals. You will also need an interface box which allows the computer to handle these electrical signals safely. If, like me, you work on an A3000 you could have an extra snag – the lack of a fitted serial port.

Luckily, I have access to a good old A310 with 1Mb of memory so my reviewing has been carried out on that most basic, machine. Having said that, the software all runs perfectly on my own computer. It is just that I can't plug in any devices. For the small sum of £17 I could buy the required circuitry and then an A3000 will do everything.

Analogue or digital

There are two programs forming the Insight suite. Analogue is concerned with the measurement of continuously variable data such as temperature, light levels, pH and so on. Digital operates with data which is either on or off. This is used, for example, for measuring the speed of vehicles which are made to interrupt a light beam.

Insight is designed to run with four of the most common interfaces used in schools. I use a *Sense and Control* unit supplied by NCET but *Sense IT*, *LogIT* and the Philip Harris system are all supported.

Insight Analogue can be very simply set up so that it knows which system you use. For some reason, this is not the case with the Digital program. Users must tell it which interface they are using each time they start up the program.

The analogue program will probably be of more general use. Certainly, the National Curriculum requires primary pupils to experience computer sensing and measurement so all primary teachers – as well as secondary science teachers – could use this program.

It offers a huge range of options but retains the simplicity of a good piece of multi-tasking Risc OS software.

Get the flux

What you can measure does depend on the sensors you have available. Temperature, light and movement sensors all have general use – you really can watch grass grow or paint dry – while pH sensors, oxygen level testers or magnetic flux measurers might apply to more advanced secondary science.

Up to four sensors or inputs can be used at once and the program can display the incoming data as a graph against time. Four sets of points or lines can be displayed on one set of axes although it is possible to display different Y axes at either end of the graph.

The time display can be in elapsed or real time. This is a very useful option since the data collection time can be varied between two seconds and seven days. Sample rates then vary between a tenth of a second and a reading every quarter of an hour.

Of course, with multi-tasking, these long experiments become real possibilities. The computer is not tied up and out of use. Other tasks – word-processing, DTP and so on – can go ahead with no difficulty.

Multi-tasking also allows the use of the font manager. The system font can be consigned to the scrap heap and a decent, rounded and readable font can replace it. There is enough room on the disc to add quite a range of fonts, but a single good one is probably enough.

Another option is to use one input as the X axis and a second as the Y axis. This opens up exciting possibilities for comparing two variables to see if there is any correlation between them.

The graphing options can really be described in one word – superb. The zoom option is very easy to use. So too are a range of analysis tools which enable averages, areas and gradients to be found with consummate ease.

The program expects up to four input devices but can plot eight lines. The four spare lines can be used to plot calculations such as Input 1 minus Input 2. Graphs can be displayed as a series of points or lines or even in bar chart format.

Just a moment

Output can be to a standard Risc OS printer driver, or the data can be saved in a special Insight format or as one of the standard – CSV or TSV – filetypes. These can be loaded into a number of databases, spreadsheets or graphics programs. I would have liked a sprite or drawfile save option so that graphs could be easily incorporated into a DTP presentation.

The second program, Digital has a more specific use and will appeal most to teachers involved in secondary science. It is designed to be used with various types of switches which start and stop the clock – light gates are ideal.

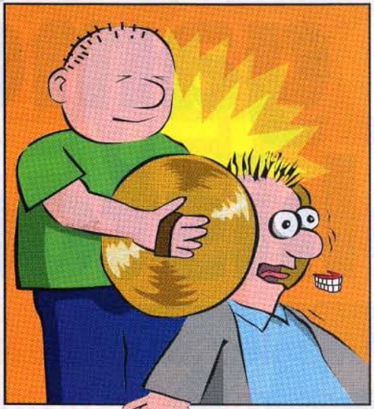
This information, along with other data typed in by the operator, is used to compute various factors related to movement. These include time, speed, acceleration and momentum. The whole process has the usual Risc OS intuitive feel to it allowing youngsters to get to grips with the fairly complex science involved.

Summing up

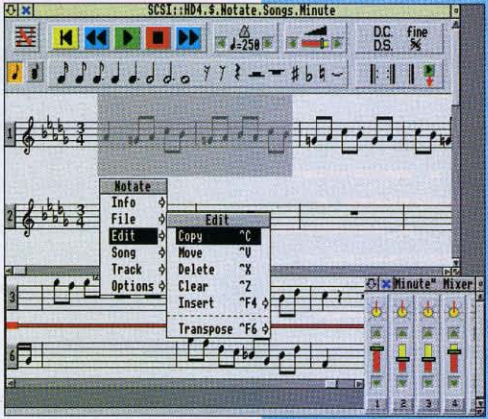
The software is supported by a superb set of work cards. Some are general in nature, giving advice on investigations, variables and reporting. Others are aimed at a specific idea such as finding which shape of mug keeps coffee warmest. These cards are a superb resource.

Also of great use is the database of other potential ideas for measurement with a computer. This is an area which causes IT and science teachers much heartache, and a huge list of ideas, together with contact addresses are most welcome.

Insight is the essential program for measurement and analysis using the 32-bit range of computers. It should be a high priority for all schools and for home experimenters.



COMPOSE YOURSELF!



Last week, Miss Brown was in a tangle. Her music class wasn't prepared in time. One group wanted to play the drums, but the music budget barely stretches to a tambourine. Another wanted to write its own music, but it all got rather messy. In the end, she got them all to sing a round song.

This week, Miss Brown is using *Notate*. Now composing music is easy — notes, rests etc. can be placed directly on the screen. Then the music can be played back immediately, and changes made to rhythm, tempo or pitch. When it's done, they're going to print out their piece — a nice neat copy for every musician in the class.

Next week Miss Brown is going to introduce 'Music of the World'. African rhythms, marches, rap, pentatonic scales — *Notate* can do the lot. It's even simple to move individual parts between tunes — ever heard the National anthem with a reggae percussion section?

Notate uses the standard Archimedes 'voices'. The computer can sound like anything from a cow bell to a trombone, from a melodic tom-tom to a hand clap. And up to eight of these 'instruments' can be played at once.

Miss Brown has a sound sampler attached to her Archimedes too, so she can record more of her own instruments. Including the human voice. So now three students are singing a barber shop quartet — the computer is humming the fourth part.

Whether you want to play percussion with seven year olds or think theory with seventeen year olds,
compose yourself —
with *Notate*.

Notate

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- Export and import of MIDI format 1 files
- Ability to play via MIDI where a suitable interface is fitted.

Notate is available now, priced at £59.

A site licence for Notate costs £190 for a primary school and £330 for a secondary school

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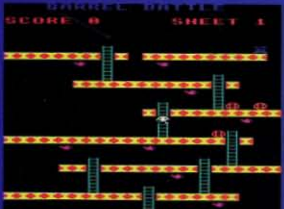
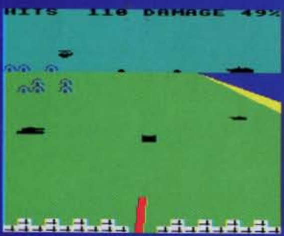
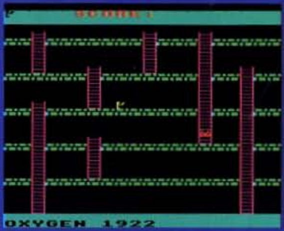
Air Strike Test your skill over three levels of surface-skimming flying, taking out air bases and destroying aliens. Fast, furious and a little tricky. *May 1983*



Barrel Battle A fun game to keep you amused for hours. Collect the teapots, climb the ladders and avoid the barrels rolling down the levels. *January 1984*

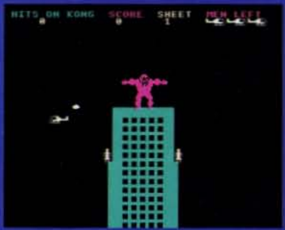


Death Watch A game for the paranoid. Attacked from land, sea and air you must defend your position by efficient use of the cannon. *March 1983*



Fruitie The fruit patch is filled with nasties which follow you through levels and up ladders. Your only defence is how fast you can dig. *August 1983,*

Goblins Armed with five magic coins you must find your way around a maze of trees, avoiding and destroying the deadly goblins. *November 1983*



King Kong The classic villain has kidnapped two girls and once again sits astride the Empire State Building. Can you avoid the falling boulders and rescue the girls? *April 1983*

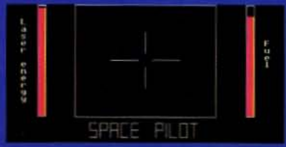
A unique selection of classic games charting the history of the original BBC Micro

OUR exclusive offer is a special collection of 10 classic games from Year One of The Micro User. A nostalgic compilation that lets you recapture the games we played in the early days of home computing.

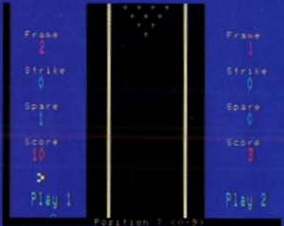
Although originally programmed for the BBC Micro, you can now enjoy this selection on the B+, Master, Compact as well as on the Acorn A3000 and Archimedes. All of them capture the essence of the early Eighties.

Robin Hood Meet the Sheriff in this version of the classic love story. Firing arrows at the baddies creates a ladder to rescue Marion. *September 1983*

Space Pod A new threat from outer space. These creatures will eat your base unless killed with the lasers. A simple and finger-aching version of Space Invaders. *July 1983*



Space Pilot A sophisticated and polished space game. Sharp shooting, docking and landing on planets all need a keen eye and precise positioning. *June 1983*



Ten Pin Go down the alley but keep out of the gulley in this computer version of 10-pin bowling. But it's not quite as simple as it seems. *July 1983*

10 pioneering programs – for just £9.95!

ORDER FORM

The History of the Micro User Games Volume 1 costs £9.95 on all formats.

Please send me (tick your choice):

☐ BBC B/Master disc 40/80 track flippy
☐ Master Compact disc
☐ BBC B tape
☐ BBC A3000/Archimedes disc

I wish to pay by ☐ cheque/postal order made payable to Europress Publications
☐ Visa/Access

Expiry date /

Name..........

Address..........

..........Postcode..........

Signature..........Tel:..........

Now send to:

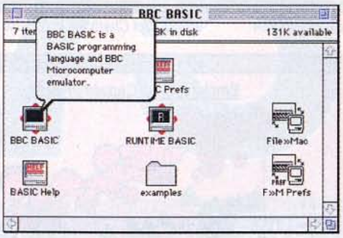
History of the Micro User Offer, Europa House, Adlington Park, Macclesfield SK10 4NP.

BBC BASIC Version 3

Programming language and Emulator for the Apple™ Macintosh™

Combines the power of the Macintosh …

BBC BASIC 3 takes advantage of the advanced features of the Macintosh, and System 7, to provide an ideal environment in which to develop, test, and run your BASIC programs.



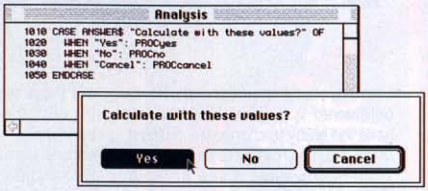
BBC BASIC is a BASIC programming language and BBC Microcomputer emulator.

Balloon help provides instant information about the menus and dialogue-box options.

Save Graphics option saves the BBC BASIC graphics screen as a PICT file that can be loaded into other programs.

Runtime BASIC utility converts your BASIC programs into stand-alone double-clickable Macintosh applications.

Macintosh-style interactive editor provides a scrolling view of program listings with convenient cursor or mouse editing. You can work with any font available on your system and you can display keywords highlighted in bold for easy reference.



```
1010 CASE ANSWER$ "Calculate with these values?" OF
1020   WHEN "Yes": PROCyes
1030   WHEN "No": PROCno
1040   WHEN "Cancel": PROCcancel
1050 ENDCASE
```

Calculate with these values?

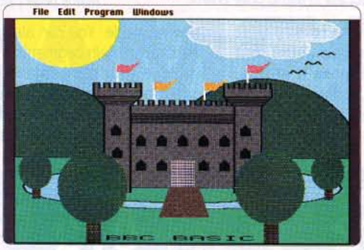
Macintosh Toolbox interface allows you to define your own menus, dialogue boxes, and scrolling lists using convenient BASIC keywords, and use the standard file dialogues for opening and saving data files.

Dynamic tracing and debugging lets you run or step through a program, highlighting each statement as it is executed, and you can display the values of any variables or expressions.

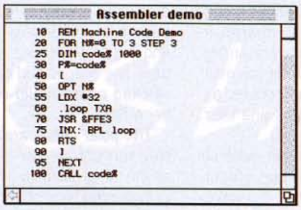
Comprehensive help system gives you instant information on keywords and operators, without interrupting what you are doing.

…with the best of the BBC Microcomputer:

BBC BASIC for the Macintosh gives you access to the foremost educational programming language in the UK, with the ability to run many programs originally developed for the BBC Microcomputer.



Emulates BBC Microcomputer graphics and screen modes, including Teletext. Work in full colour on an LC or Macintosh II, or grey shades on a monochrome Macintosh.



```
 10 REM Machine Code Demo
 20 FOR N%=0 TO 3 STEP 3
 25 DIM code% 1000
 30 P%=code%
 40 [
 50 OPT N%
 55 LDX #32
 60 .loop TXA
 70 JSR &FFE3
 75 INX: BPL loop
 80 RTS
 90 ]
 95 NEXT
100 CALL code%
```

Built-in assembler and 6502 machine-code interpreter allows you to compile and run 6502 assembler programs, or machine code which you have loaded in directly.

Full emulation of the BBC Microcomputer Operating System including all the standard system calls and vectors, OSBYTE, OSWORD, *FX calls, VDU codes, function keys, sound, and DFS/ADFS commands.

Includes File»Mac transfer utility to transfer programs and data files to or from an Acorn Archimedes or BBC Microcomputer.

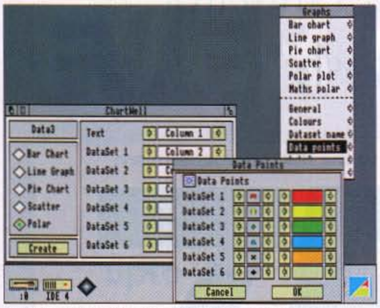
HUMAN▼COMPUTER
INTERFACE · LIMITED

Human-Computer Interface Limited,
FREEPOST, Cambridge, CB1 1BR
(no stamp required if posted in UK)

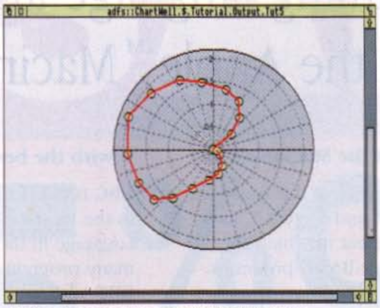
Telephone: (0223) 314934. Fax: (0223) 462562

APPLE AND MACINTOSH ARE TRADEMARKS OF APPLE COMPUTER, INC. ACORN AND ARCHIMEDES ARE TRADEMARKS OF ACORN COMPUTER LTD.

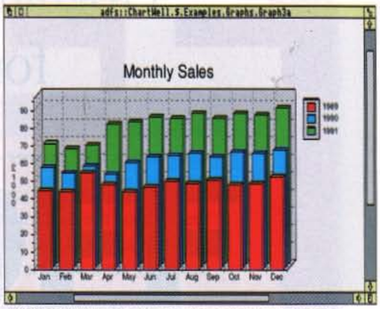
Putting


Graphs
Bar chart
Line graph
Pie chart
Scatter
Polar plot
Maths polar
General
Colours
Dataset name
Data points
ChartWell
Data3
Bar Chart
Line Graph
Pie Chart
Scatter
Polar
Create
Text
DataSet 1
DataSet 2
DataSet 3
DataSet 4
DataSet 5
DataSet 6
Column 1
Column 2
Data Points
Cancel
OK
IDE 4

ChartWell gives you access to Maths polar charts


adfs::ChartWell.$.Tutorial.Output.Tut5

Maths polar can only be seen finished via Draw


adfs::ChartWell.$.Examples.Graphs.Graph3a
Monthly Sales
1989
1990
1991
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

Yet ChartWell is capable of quite sophisticated graphs

IT may be trite to say that first impressions count, but that doesn't make it untrue. The Acorn 32-bit machines lend themselves to the easy interaction of data and graphics so let's take a look at three very different packages which aim to make your information shine in charts and graphs. But which horse is right for which course?

ChartWell

Risc Developments produce packages which are, on the whole, economically priced and easy to use, and Chartwell is no exception. However, if this is your first foray into presenting data in chart or graph format you may be a little daunted by the options, as some knowledge of graphs and their usage is assumed.

You have five basic graph types at your disposal: Bar, line, pie, scatter and polar. However, these can have numerous customisations made to them. But first of all you need to get your data.

Unlike the other two packages Chartwell assumes that you have saved a CSV – comma separated value – file from, say, a spreadsheet. There is no facility for entering data into the package itself but you can enter the information as a text file in !Edit and then import it.

Clicking the icon from the icon bar puts a window on your desktop, which sends you straight to the manual for the tutorial section – with all these packages, go through the tutorials carefully otherwise you won't get the most out of them.

Now drag your CSV or text file into this window and the data will be loaded. It is now up to you to make it stand out well in a presentation. Clicking Menu gives you access to the chart formats with their various options.

For instance, the pie chart option opens to give you the choice of proportional size, legend, 3D and the viewing angle. You can also decide to withdraw certain segments.

Make your choices and then you can decide on the background, colours, names for your data, labels for your graph as well as specify which data points to use with line graphs.

The best way to find your way around is to experiment to see which graph type gives the best result. To keep the program short and economical the ability to show the graph has not been provided – instead you must drag the resulting drawfile to !Draw.

Where you're experimenting with options this can become tedious and an instant display option would have been a useful addition. The scatter and line graph options with their error bars, line options and cumulative and stacked areas would certainly have benefited.

The polar charts are a more complex concept but just as easy to use as the more common graphs and well documented. The two options open to you are polar charts defined by data or by equation.

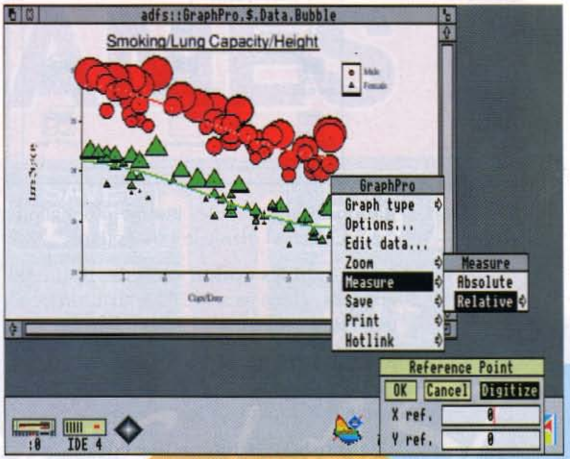
The data breaks down into the distance from the centre and the angle, while the mathematical chart requires a source equation and produces the graph once the equation is confirmed.

Illustrating data

Though this looks complex it is really a scatter graph but using angular data. Out of the three packages covered here it is the only one to allow for a mathematical polar chart.

You can have up to 32 datasets with only six on a graph at one time – but this limitation should only worry the specialist user.

Should you have two sets of data, for example, the hours spent travelling and ages of a group of commuters, these will fill datasets one and two with the names Column 1 and Column 2. The other fields will retain the words none. But if one of the fields was text – say, the destinations travelled from – this data would be entered in the Text field. You do have the ability to change the position of the columns relative to each other.


adfs::GraphPro.$.Data.Bubble
Smoking/Lung Capacity/Height
Male
Female
GraphPro
Graph type
Options...
Edit data...
Zoom
Measure
Save
Print
Hotlink
Measure
Absolute
Relative
Reference Point
OK
Cancel
Digitize
X ref.
Y ref.
IDE 4

The Graphbox Pro measure facility allows for complex analysis

Once you have made all your choices you click on the create button. A GraphFile appears which you must drag on to the previously loaded Draw application waiting for you on the icon bar. Alternatively the file can be dragged to disc, or some other package that can display drawfiles.

ChartWell can be best seen as a data translation utility, allowing you to change data from CSV format to a more meaningful graph in drawfile format, which in turn can be easily ported to other applications. You can save particular settings as style sheets which is a definite time saver.

The graph types, while not as extensive as some other packages, are those most commonly used and the customisation features are comprehensive and easy to use – the options available for a certain graph type are given in sub-menus.

The trick is to make sure that the data you are importing is how you want it and remember that ChartWell only deals in positive values.

Presenter GTi

As with ChartWell, Presenter GTi has a very useful tutorial but the approach is different. You can import text, CSV and TSV – Tab Separated Files, which Presenter treats as CSV files – but in addition you can input your data straight into a spreadsheet-style window.

Information can be saved in CSV

Product: ChartWell
Price: £29.95 inc VAT
Supplier: Risc Developments, 117
Hatfield Road, St Albans, Herts
AL1 4JS.
Tel: 0727 40303
Requirements: Risc OS

Product: Presenter GTi
Price: £69.95
Supplier: Lingenuity, Wood Farm,
Linstead Magna, Halesworth,
Suffolk IP19 0DU.
Tel: 098 685 477
Requirements: Risc OS

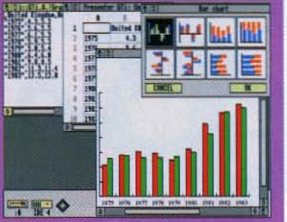
Product: GraphBox Professional
Price: £129
Supplier: Minerva, Baring Crescent,
Exeter, Devon EX1 1TL.
Tel: 0392 437756
Requirements: Risc OS

Creating your own CSV file

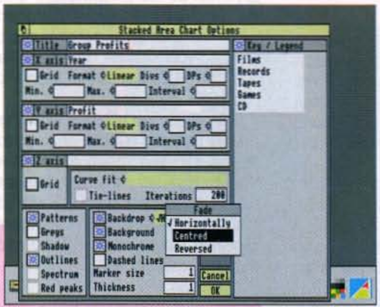
If you haven't got access to Schema, Pipedream and so on, or it is not appropriate to use them, you can enter your data in CSV format in a wordprocessor and save it as a text file.

All you have to remember is to separate each set of numbers with a comma and end each line with a Return. You'll also come across TSV which is the same system, except that commas are replaced by tabs.

Presenter GTi treats both as CSV files. It's quite easy to load a TSV file into !Edit and, using search and replace, make all your data into CSV files.

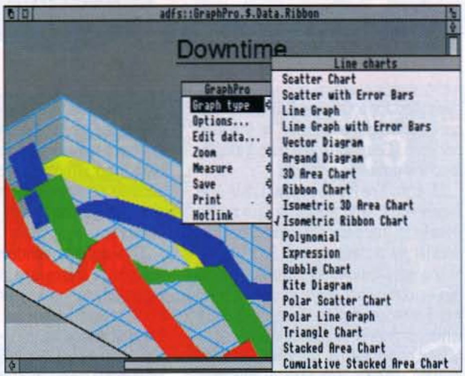

CANCEL
OK
1975 1976 1977 1978 1979 1980 1981 1982 1983

Making figures talk – CSV to chart


Stacked Area Chart Options
Grid
Format
Linear
Divs
DPs
Min.
Max.
Interval
Z axis
Curve fit
Tie-lines
Fade
Horizontally
Centred
Reversed
Patterns
Greys
Shadow
Outlines
Spectrum
Red peaks
Backdrop
Background
Monochrome
Dashed lines
Cancel
OK

Title: Group Profits
X axis: Year
Y axis: Profit
Key / Legend: Films, Records, Tapes, Games, CD
Iterations: 200
Marker size: 1
Thickness: 1

The Graphbox options window with its own set of sub-menus


adfs::GraphPro.$.Data.Ribbon
Downtime
GraphPro
Graph type
Options...
Edit data...
Zoom
Measure
Save
Print
Hotlink
Line charts
Scatter Chart
Scatter with Error Bars
Line Graph
Line Graph with Error Bars
Vector Diagram
Argand Diagram
3D Area Chart
Ribbon Chart
Isometric 3D Area Chart
✓ Isometric Ribbon Chart
Polynomial
Expression
Bubble Chart
Kite Diagram
Polar Scatter Chart
Polar Line Graph
Triangle Chart
Stacked Area Chart
Cumulative Stacked Area Chart

Ribbon charts in Graphbox are an uncommon way to put data across

on the Ritz

Jo Giles puts three presentation packages through their paces

form or as a GTi file which keeps the data with the plotted chart or you can just save and print the graph in Draw.

The icon bar menu gives you the options of loading CSV files vertically or horizontally. Columns are usually the datasets and rows the observations, but these can be flipped. In addition you can update the chart display automatically whenever you change any information – a very useful facility indeed.

You can have a maximum of four sheets on screen at once but the major difference between this package and ChartWell is the method of data input.

The standard method involves dragging a CSV file on to the GTi icon on the icon bar. But the insert method means that you must drag the CSV file into the active GTi windows. Each method is equally successful, though the standard option will make sure that there are enough columns and rows created to accommodate your information.

Inputting data

The inserting method comes into its own when you are inserting data at the cursor in a specific position on a very large worksheet. As this method is designed for merging data it will not redesign the worksheet.

There is a good selection of graph types and it is simple to change your choices and see the results instantly. If you find large menus intimidating, you'll welcome GTi.

The worksheet appears when you select GTi from the icon bar and if you don't want to input CSV files you can just type in the data yourself. Very like a spreadsheet in appearance the input window provides a much simpler method of data input than creating a CSV file in Edit.

Some of the features more common to word processing allow you to copy, delete, paste and insert columns and rows at will – all with function key shortcuts. Some simple rules must be followed, such as putting labels in quotes to differentiate them from values, but these points are highlighted in the manual.

Sample files are included on the disc and the tutorial takes you through graph creation in a step-by-step manner. Once you have your data on screen in the order you desire, you need to find the best and most effective display. You can choose from bar, line, area, scatter and pie charts. Select one and you'll be presented with a graphical menu of 8, 8, 3, 4 and 8 types of that particular chart respectively. For instance the bar chart allows you to display your data horizontally or vertically with negative and positive axes, stacked or overlayed.

Once you have selected one your data is automatically put into that style. If you don't like it just click one of the others. It's quick and easy and it doesn't matter if you know the correct names of what you want to create.

The graph window itself presents you with a different menu which allows you to customise your graph. You can give it a title and a sub-title and change the font, style and size.

The options choice on the sub-menu gives you one window which is used with all the graph types. These options make a simple graph more professional and finished.

Personalising graphs

You are given a good deal of control over the charts and graphs being able to alter the margins – a chart window is a standard A5 sheet – as well as the width of the bars in bar charts and the bar overlaps.

You can add a key or legend to your graph, horizontally or vertically, and at a specific coordinate, or drag it into position with your mouse.

Bar and line charts can have horizontal and/or vertical grids as well as a box. The explode row option for a pie segment as well as the pie chart start option is given at the position of 12, 3, 6, or 9 o'clock. If you are working with best fit lines the group datasets option will be useful as you can group sets together to make a single average.

The special effects give you 3D, shadow and value labels – the value is put above each point or segment in bar, line and pie charts. As with ChartWell you can define the data points with shape, size and colour in the Data window.

This is where you specify the join and best fit lines in colour and thickness with the option of a window containing the calculated value of the best-fit line. Axes have their own sub-menu window allowing you to choose tick spacing, intersect points, labelling and positioning and there is also a zoom option for more detailed work.

The learning curve for this package is very quick and it's intuitive to use. The results are instant and amendments simple to make.

If you have Presenter II or HotLink

➤

Links

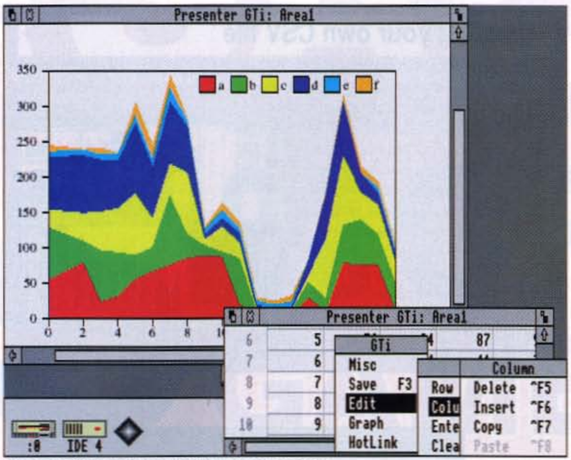
It's a shame that Computer Concepts' Impulse system isn't being adopted by more companies as it removes the dependence on hotlinks to specific packages and allows classes of software to communicate with other classes using standard commands.

It would mean that you could have the spreadsheets and charting software you prefer communicating, instead of being forced to use specific ones, that may not have the facilities you want.

Presenter from Lingenuity, there is a utility supplied !Pres->GTi to convert your files to this new format, GTi making intelligent guesses when needed.

A hotlink facility allows you to load data from a spreadsheet – change your figures in a spreadsheet and they'll be updated in GTi's worksheet and graph – you will need at least 2Mb of ram for this though and these hotlinks will only work with Pipedream.

The manual is very well written with a quick start tutorial followed by greater explanations on each part of the program. You'll find useful tips throughout as well as good advice.



Presenter GTi's worksheet facility makes it stand out

GraphBox Pro

The largest and most expensive of the three packages under test, it too is an updated version of an earlier program. As with GTi and ChartWell, GraphBox is fully multitasking and comes with a comprehensive manual and tutorial. In addition there are two outline fonts and a toolkit of useful images.

In total there are 43 graph types, if the list seems daunting don't despair as the manual outlines each one giving some idea as to their use and suitability.

Data is taken from CSV, TSV and Ascii as well as the hotlink to Pipedream facility also available in GTi. You'll also be able to use the SID format – Software-Independent Data often produced by databases and the like – directly. In simple terms a SID file is a CSV file with codes of graphing instructions added. You can save your finished data in SID format too or choose from Draw, CSV or Edit formats.

More than the other two packages the tutorial is a must if you are to use GraphBox properly and not get swamped by the amount of information given in the manual.

Once you select GraphBox you're prompted for a CSV or SID file or you can just drag the data on to the icon bar icon. GraphBox will automatically load the data into a graph.

If you are loading a CSV file GraphBox will add the graphing details to the data. You can alter this default by accessing the Params file in the application itself. You can also save useful graph styles and load them without altering the current data, which definitely saves time and keeps output consistent.

Now you have a graph. You may want to add to this, change the style or customise the presentation. The submenus are huge and unlike GTi's graphical representation, not very informative. But the chapter on graph types will tell you the one you want.

The options window sub-menu informs you which options are inactive and it is here that you can add the title, name the axes, decide the patterns, shadows and backdrop as well as editing the key and selecting grids and so on.

Being able to use patterns instead of colours in pie and bar charts is useful for mono display or hardcopy. An excellent finishing touch is the backdrop which can be horizontal, centred or reversed. The background sits behind the graph on top of the backdrop.

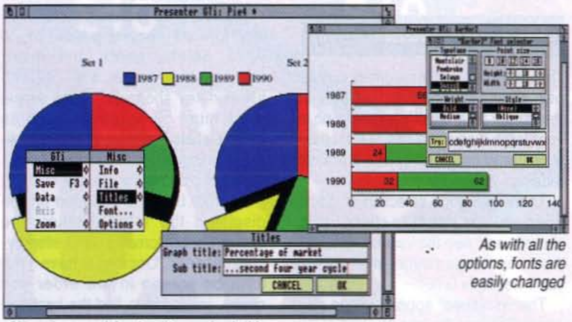
This options window can be confusing as there are hidden extras especially in the x, y and z axes. But if you follow the tutorial it will take you through these in turn – bezier joins, quadratic and cubic fits. The ability to clip data is very useful when you want to look in detail at one portion of a line graph without losing the accuracy of the curve fit.

Using the worksheet

To edit the values of the graph, you'll need to access the data sub-window which will present you with a worksheet similar to the one available in GTi. Any edited data is automatically updated and if necessary the axes are redrawn to accommodate it. You can add, insert and delete rows and columns at will.

There's a useful zoom facility: Double-clicking on the graph reduces it to 1:2, click again and it returns to 1:1. You can also alter the zoom via the menu to a maximum of 1:16.

Unique to GraphBox is the measure procedure. You can measure absolutely or relative to a particular point, which is useful for vector diagrams as well as for discovering the gradient at a point on a curve. A must for scientific and mathematical users enabling you to measure values on fit lines to project results for unknowns.



Graph title: Percentage of market
Sub title: ...second four year cycle

As with all the options, fonts are easily changed

GTi makes provision for titles and sub-titles

An array of graphs

Yet it is the sheer number and variety of chart types which makes GraphBox stand out. The most impressive visually must be the picture chart. Until the pictures are loaded the chart looks like another spread bar chart, but drag your drawfile containing the drawing you want on to the graph and it becomes illustrated.

Best effects are obtained when the chart is tiled and outlines are toggled off. You can also specify the number of symbols in the y axis sub-divisions setting for the best effect. As with all these packages, you must experiment to obtain the most interesting and unusual presentations.

Summing up

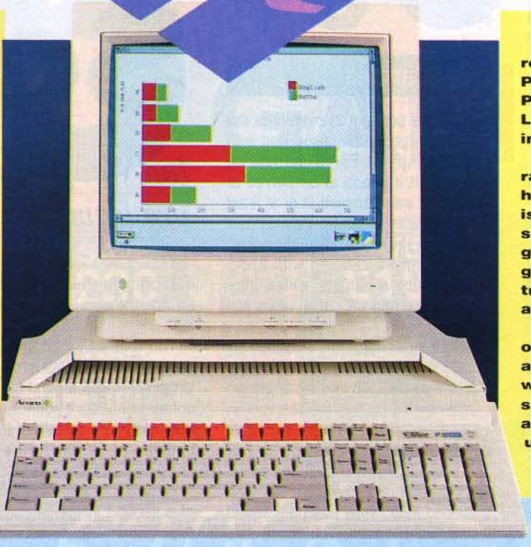
I found GraphBox Professional the most comprehensive. The quantity of useful information is impressive but may seem a little daunting. Yet your hand is held securely and the more experienced user will appreciate the vast range of options even though some of them are not easy to find.

Presenter GTi is the package to buy if you know what you want to see on page and don't want to be bothered by unnecessary maths. Easy to use, its spreadsheet-style input is good. Results can be produced quickly and effectively with little time and effort. As with GraphBox the hotlink utility is a good extra if you want to have more access to graphs than Pipedream 4 offers.

Chartwell I would recommend to someone on a tighter budget who knows what they want and understands the complexities. It is easy to create bar and pie charts and, as with all the packages, it comes with a tutorial.

presenter GTi

THE PRINCIPLES OF PRESENTER TAKEN TO NEW HEIGHTS



Following extensive research amongst Presenter II and Hotlink Presenter users, Lingenuity is delighted to introduce Presenter GTi.

Generating a vast range of graphs and charts has never been easier. Data is entered and edited via a simple worksheet, and all graphs can be saved as genuine draw files and/or transferred into other applications.

Presenter GTi's Hotlink option gives the user the ability to communicate with other applications such as Pipedream 3 - allowing relevant data to be updated continuously for the displayed graph.

EXISTING PRESENTER FEATURES:

- Bar, Line & Pie charts
- 3-Dimensional displays
- Auto scaling
- Fast Hotlink transfer
- User definable layouts
- Full colour or monochrome graphs
- Supports CSV file format for loading and saving data

NEW GTi FEATURES:

- Multiple Pie chart display
- Logarithmic axis scaling
- Regression line (Line-of-Best-Fit) data available: Constant, Gradient, t ratio, Residual value, R^2
- Function key short cuts
- Zoom option for graph display
- Multiple document capability
- Multiple view option
  - File Information box
  - Instant display of saved graphs

ENHANCED GTi FEATURES:

- Wider range of Graph types:-
  - 8 different types of Bar charts
  - 4 different types of Line charts
  - 3 different types of Pie charts
  - Scattergrams
  - 2 different types of area chart
- Dynamic worksheet area.
- Comprehensive file information
- Auto Label/Data detection
- Easier-to-use data entry window
- Increased display options for all graphs
- Faster draw and screen update routines
- Grids available for all graphs
- Data point symbols - selectable
- Line patterns - selectable

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Sounds

Ian Waugh cocks his ear to a couple of programs to improve the sound of music

Product: Vox Box
Price: £61.95 (inc VAT)
Product: ScoreDraw
Price: £61.95 (inc VAT)
Supplier: Clares Micro Supplies,
98 Middlewich Road, Northwich,
Cheshire CW9 7DA.
Tel: 0606 48511
Requirements: Risc OS, Rhapsody II

VOXBOX and ScoreDraw are two new programs from Clares designed to complement Rhapsody II – reviewed in the November 1991 issue of *The Micro User.*

VoxBox was programmed by the author of Rhapsody and is actually a suite of three programs – VoxBeat, VoxSample and VoxSynth – plus Perform, a separate but related utility.

The three Vox programs have a number of common features. You can play the sounds from an external Midi keyboard – if you have a Midi interface – even as you edit them. You can also play them from the Archimedes' keyboard.

Six folders of samples are provided on a separate disc so you have some raw material to start work on. You can lift others from many sources including games, Tracker demos and so on. The programs can handle samples in the three most common formats – signed linear which is used by most samplers, unsigned linear and logarithmic used by the Arc's sound system and VoxBox's natural format.

VoxBeat

The simplest of the three programs, it was primarily designed to create samples for use in a drum kit. It can only play back one sample at a time, however, but it lets you assign a different sample to each of the 12 notes in an octave, so each can play a different drum sound. You can set the pitch and volume of each sample too.

The VoxBeat window shows a sample after loading and you can highlight a section of it for playing. The end of a truncated sample is likely to sound cut-off but you can create a short *fade-out* to alleviate this problem.

Up to seven VoxBeat modules can be used at the same time giving you a total of 96 samples. But remember, samples use memory. VoxBeat can use any sample so you could construct simple Tracker-like pieces with it. The manual suggests it could be used as a speech synthesiser to speak the digits from 0 to 9 or as a sound FX machine for use in a theatre.

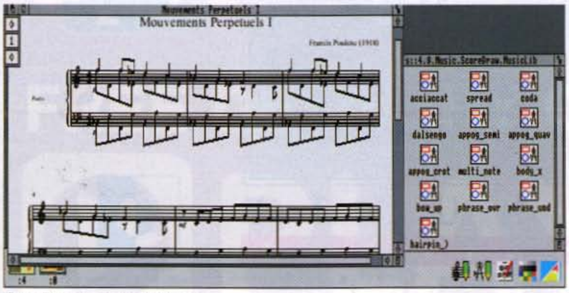
VoxSample

VoxSample sets out to overcome the three main problems associated with using samples. For a sample to sound right it needs to be played at the pitch it was sampled at or at least very close to it. Samples may not always be the correct length, either, unless you are dealing with short sounds such as drums. Often they are too short and will cut off when you play long notes.

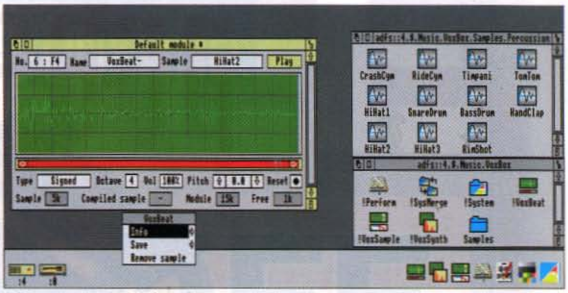
VoxSample helps the situation by using the attack portion, or transient, of the sample followed by a looped section for the body of the sound. The initial transient has the greatest effect on our perception of the sound. The use of a loop means that the actual sample need rarely be more than half a second long, while playing a sound lasting much longer. You can create amplitude and pitch envelopes for the samples, too.

The VoxSample window has a similar sample display area to VoxBeat with amplitude and pitch envelopes beneath it. As in VoxBeat, you can highlight a section of the sample. You can also adjust the number of loop cycles which you need to do to find the optimum setting to produce the best sound.

A little trial and error is called for here and although the manual explains the process well, some extra information plus a couple of worked examples would be very helpful, especially for relative newcomers to sound synthesis and sample processing.



ScoreDraw improves your image



Editing sounds with VoxSample

You can edit the amplitude and pitch envelopes by clicking and dragging their nodes around the window – not as painful as it sounds. There is a ruler along the bottom of the window marked in 100ths, 10ths and seconds. You can alter the scale by dragging the ruler from showing 20/100ths of a second in the window up to 10 seconds.

The envelopes only have two phases – sustain and release – but each can contain up to six nodes. In addition, the nodes in the looped section of the wave are coloured red, so you can see how the looped section is going to be shaped by the envelopes. Again, some worked examples would have helped make the process easier to understand.

VoxSynth

VoxSynth provides eight independent voices, each defined by two waveforms which may be drawn by hand, synthesised from harmonic components or created mathematically using a simple form of FM made famous by Yamaha's range of DX synths.

The sound can change from one waveform to the other, a process known as real-time linear interpolation – the sonic equivalent of the inbetweening process used in making cartoons.

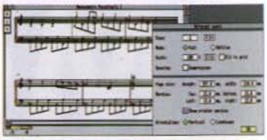
This is the most complex of the three programs. A single voice has two waveforms which you select by clicking on an A/B box. They are shown both as a waveform and as a set of the first 32 harmonics. During play, wave A can turn into wave B and you can set the time it takes to do this. It would have been nice to see both waves side by side along with the actual waveform produced during interpolation.

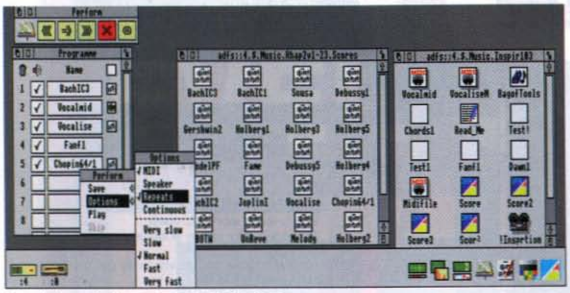
At first you may think response to mouse clicks is a little sluggish – it can take a second to add or delete a harmonic – and initially you may find yourself clicking twice on an area. However, you can click and drag in both windows which leaves a dotted line.

Release the button and the waveform or harmonics are drawn in – very nice. It's worth pointing out that it's very difficult to draw satisfactory waveforms freehand. The manual includes a list of the harmonics of common instruments.

Just to add a little spice, there is a set of eight parameters which let you modulate one waveform with the other – a form of FM or harmonic synthesis by frequency modulation as it's technically known.

VoxSynth can load real samples and analyse their harmonic content which you can attempt to imitate. Like VoxSample, you can also impose amplitude and pitch envelopes on the sound. One of its major advantages is compactness as an eight-voice




Perform
Programme
Name
1 BachIC3
2 Vocalmid
3 Vocalise
4 Fanfl
5 Chopin64/1
6
7
8
Perform
Save
Options
Play
Options
MIDI
Speaker
Repeats
Continuous
Very slow
Slow
Normal
Fast
Very fast
adfs::4.$.Music.Rhap2v1-23.Scores
BachIC3
BachIC1
Sousa
Debussy1
Gershwin2
Holberg1
Holberg3
Holberg5
Debussy5
Holberg4
Fame
JoplinI
Vocalise
Chopin64/1
UnReve
Melody
Holberg2
adfs::4.$.Music.Inspir183
Vocalmid
VocaliseM
BagofTools
Chords1
Read_Me
Test!
Test1
Fanfl
Dawn1
Midifile
Score
Score2
Score3
!Insertion

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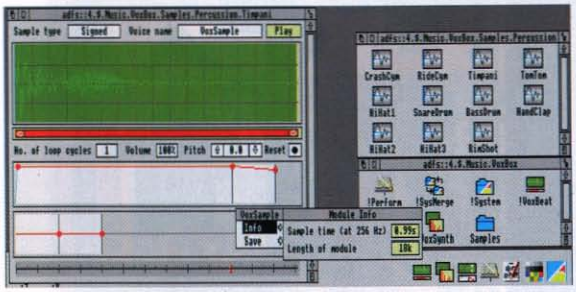

adfs::4.$.Music.VoxBox.Samples.Percussion.Timpani
Play
Reset
adfs::4.$.Music.VoxBox.Samples.Percussion
CrashCym
RideCym
Timpani
TomTom
HiHat1
SnareDrum
BassDrum
HandClap
HiHat2
HiHat3
RimShot
adfs::4.$.Music.VoxBox
!Perform
!SysMerge
!System
!VoxBeat
VoxSynth
Samples
VoxSample
Info
Save
Module Info

Sample type: Signed
Voice name: VoxSample
No. of loop cycles: 1
Volume: 100%
Pitch: 0.0
Sample time (at 256 Hz): 0.99s
Length of module: 10k

VoxSample has many samples provided

VoxSynth module is only 5k in size. Apart from the fun, it's an excellent aid to understanding additive synthesis, harmonics, waveforms and, to an extent, FM synthesis.

Perform

Perform is a Rhapsody and Midi file player. It can play up to 12 files in sequence without having Rhapsody present. It will play samples produced by samplers such as Clares' Armadeus and the manual suggests you use this feature to announce each track before it plays.

Details of the performance are held in a music programme – as opposed to computer program – file which is easily edited. After installing on the menu bar, you can call up a panel which contains tape recorder-type transport controls. The main programme window has spaces for the 12 programmes and to load a file into a slot you simply drag its icon into the window. The programme remembers the full filename.

Perform recognises four file types: Rhapsody (&C00), Midi files (&FD4), Sample files, signed linear format (&D3C) and Programme files (&CB9). The last option means that one Programme can call another, doing away with an individual Programme's 12-file limitation. Neat.

Perform also accepts any other file type which it will try to *Run, allowing you to execute Obey files and load new voices which solves the problem of having to have the right voices loaded for a particular tune to play correctly.

Rhapsody II recognises voices by name rather than number so you can load them in any order. There is a small utility called NoVoices which removes the voices from 10 to 32. The Options menu is similar to the one in Rhapsody with the addition of a Continuous function which repeats the Programme. The tape transport window lets you skip backwards and forwards through the list, pause and stop.

Summing up

If you use any music program which uses samples, one thing you can never have is too many samples. Many users will lift them from demos and PD sources, but for the creative and more adventurous, VoxBox offers a wealth of possibilities and potential.

Perform is a useful utility, too, but it would be more useful if there was a run-time version which you could give out containing your latest music pieces.

ScoreDraw

ALTHOUGH Rhapsody can print out music scores, it uses sprites. As well as offering only a coarse resolution, the layout is rather untidy resulting in *chunky* bit-mapped images rather than smooth and straight lines.

ScoreDraw is essentially a high quality formatting program for Rhapsody II scores. It converts them to Draw images which results in a much higher resolution and gives you more control over the placement of music symbols. You'll need Rhapsody version 1.23 or later but in case yours isn't quite up to date, a utility to update it is supplied.

The program also expects certain fonts to be present. Initially, on booting I was presented with a message telling me that fonts required by ScoreDraw were not available in my system. However, it will use whatever fonts you do have.

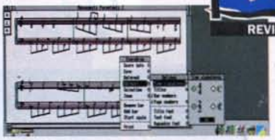
ScoreDraw interfaces almost invisibly with Rhapsody. Providing the system has *seen* the program, you can simply select the ScoreDraw format option from the Rhapsody menu. This displays the usual format window for setting scale, page orientation and so on and clicking on it produces a window containing the score – as usual – but in a Draw format. You can also transfer a Rhapsody score directly by dragging it into ScoreDraw.

There are Page tools on the edge of the window for turning pages and there are several additional options in the menu. You can save the entire score or the current page. The Reformat dialogue box lets you alter the page size and orientation, scale the score, adjust the margins and so on.

The Options menu lets you select the time signatures – 4/4 or C, for example. Whether the title and stave names are printed on every page or just the first one and whether bar and page numbers should be printed is also your choice. As are the fonts used for the title, text and dynamic markings.

You can select individual staves for formatting – as you can in Rhapsody – but in ScoreDraw you can select a group of staves and format them together. There's a Zoom function so you can examine parts of the score in greater detail.

One of the great advantages of



ScoreDraw is the ability to edit your scores in Draw, adding phrase marks and symbols not available in Rhapsody. ScoreDraw beams stems neatly and it does adjust the placing of some symbols but it does not get all the placements right and some dynamic markings and ornaments – which sit on top of the stems in Rhapsody – will have to be altered by hand in Draw.

The transfer procedure to Draw is not entirely automatic. Although the manual advises which scale and grid settings to select to make editing easy, you should be able to load ScoreDraw and Draw in a 1Mb machine and drag a score directly from one program to the other. In my version some pages – saved from ScoreDraw in Draw format – wouldn't load into Draw and flagged errors.

Several objects such as hairpins and phrase marks are supplied in Draw format and you can drag these into the window and add them to the score.

Screen redraws can be a little slow so it's a good idea to get the formatting approximately right as Rhapsody's sprites are faster at redrawing. Printing can be slow, too, although this depends on your printer and driver. An admittedly slow 4ppm postscript printer took around half an hour to output a page. Dot matrix emulation was quicker.

Summing up

ScoreDraw is an excellent utility for producing quality scores from Rhapsody files, although it would be nice if it adjusted Rhapsody's formatting idiosyncrasies automatically. And you may have to be prepared to work through the odd anomaly and bug. It would be useful to be able to work on a complete score rather than individual pages, although I'm sure most users will find it acceptable.

There is no doubt that the quality of a ScoreDraw score is far higher than that which Rhapsody is capable of producing. The Draw file format is the standard for line art graphics on the Archimedes so ScoreDraw scores are easily imported into DTP packages making it a viable proposition for anyone to produce their own music books. But you may feel that as the program costs the same as Rhapsody itself it should do a little more than it does.

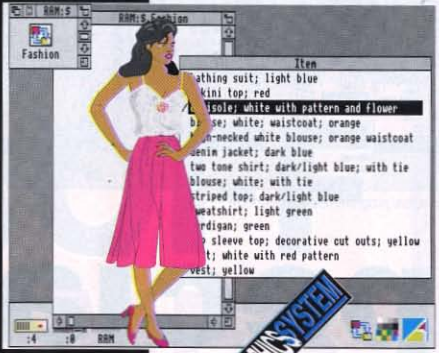
The smArt Suite

All 4Mation packages for the Archimedes carry a FREE SITE LICENCE.

SmArt is a Linked Graphics System. When picture files are loaded into smArt, different parts of the picture can be changed by making selections from a menu. The graphics components are automatically scaled so that the parts always fit. Pictures may be saved as Draw files or transferred to DTP programs or any other applications which can handle Draw files.

The smArt package comes with over two dozen files on subjects ranging from shops to cars, and churches to British Isles maps. Available as separate products are discs of smArt files on specific themes such as Leisure, Heraldry, Faces, Fashion, Homes, Trees & Gardens, and Dinosaurs.

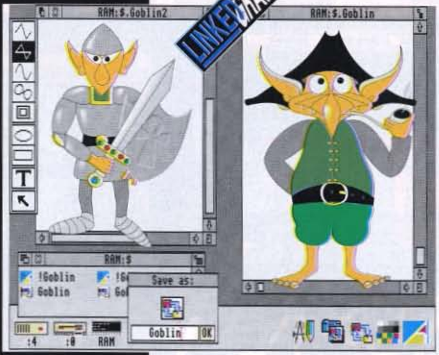
smArt £55 (NZ$ 198)   smArt discs £16 (NZ$ 59)


RAM:$
Fashion
RAM:$.Fashion
Item
athing suit; light blue
kini top; red
isole; white with pattern and flower
b se; white; waistcoat; orange
n-necked white blouse; orange waistcoat
enim jacket; dark blue
two tone shirt; dark/light blue; with tie
blouse; white; with tie
triped top; dark/light blue
weatshirt; light green
rdigan; green
sleeve top; decorative cut outs; yellow
t; white with red pattern
vest; yellow
:4
:0
RAM
LINKED GRAPHICS SYSTEM

For those wishing to create their own smArt files, smArtFiler is an application which compiles smArt files from your source Draw files. Full instructions are provided along with lots of examples. Individual components may be scaled, rotated, and placed in front of or behind other components. Menu entries may be specified.

If it can be drawn it can be a smArt file.

smArtFiler £35 (NZ$ 129)


RAM:$.Goblin2
RAM:$.Goblin
T
RAM:$
!Goblin
Goblin
Save as:
Goblin
OK
:4
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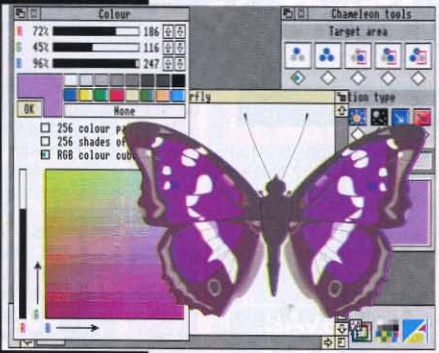
RAM

Chameleon is an ideal companion to smArt, and a must for anyone who needs to make quick and easy colour changes to Draw files. As well as palettes for 16 and 256 colour modes, there are options for 256 shades of grey and a RGB colour cube which provides thousands of colours. Colours may be selected from other Draw files so can be copied from one picture to another. Colours may also be changed in HSV values; Hue, Saturation and Value. Edited files may be saved as normal Draw files or as colour separations. A clever Undo and Redo facility allows virtually any number of colour changes to be cancelled and then reinstated. Zoom and Magnification facilities allow accurate editing of small areas.

Chameleon £25 (NZ$ 95)


Colour
R 72% 186
G 45% 116
B 96% 247
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None
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☐ 256 shades of
☒ RGB colour cub
rfly
Chameleon tools
Target area
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G
R
B

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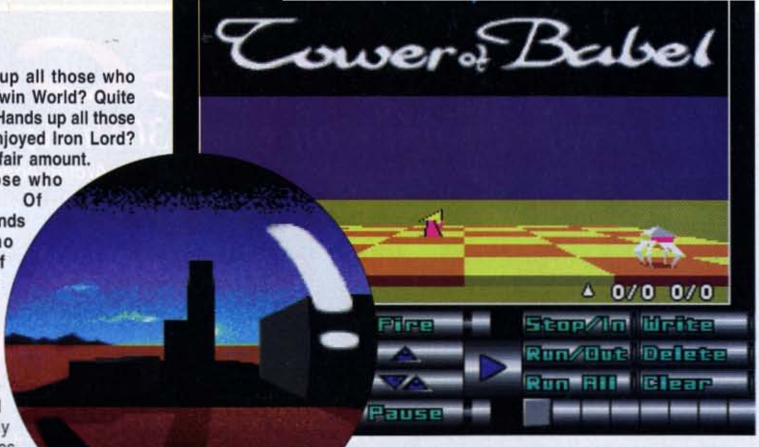
Hard Times

Ben Reilly reports on a sad tale



HANDS up all those who liked Twin World? Quite a few. Hands up all those who enjoyed Iron Lord? Still a fair amount. Hands up all those who bought Tower Of Babel... I said: "Hands up those who bought Tower Of Babel!" Oh. Not very many.

In fact, Roger Taylor – the boss man at Cygnus Software Engineering – told me that they only sold 100 copies. Yes, one hundred! Cygnus need to sell 10 times as many just to break even. Twin World was quite successful in relation to Tower of Babel, so was Iron Lord. So what went wrong with Tower?

According to Roger Tower of Babel was the most technically advanced game they had released for the Arc. They had expected it to do very well. He just can't understand why it sold so badly. The only conclusion that he can draw is that the Archimedes games market is just too small.

"But how do The Fourth Dimension do so well?" I hear you ask. Roger reckons that as they release up to two products a month, and they can afford to have the odd failure. But when it comes to a relatively small company such as Cygnus, if they have just one failure and it's curtains.

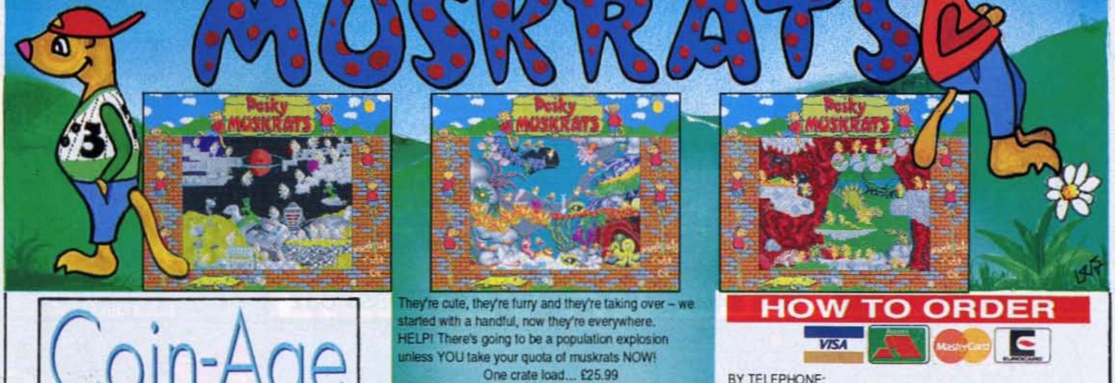
And that is just what Roger is considering, packing it in on the Archimedes front. This would be a great pity, as Cygnus were the first company to port games across to the Archimedes from the ST and Amiga. They produce stuff for the other machines, so it's not as if the Arc side of the business is the only one, but it's a loss to us.

In fact, Cygnus' shutting up shop for the Archimedes is even more disappointing than is immediately apparent, as Roger revealed to me that they had the chance to port a couple of quite superb games to the Arc. He was understandably a little reluctant to spill the beans, but he did give a little away.

Firstly, he said that they could port a football game across that was "...better than Kick Off." For those of you who don't know, Kick Off is the greatest 16-bit football game of all time.

Secondly, a sideways scrolling platform game. Something akin to Chuck Rock, "... but better." Finally, there was an interactive adventure game.

All three sound quite excellent and I for one am hoping that Cygnus give it one more go. You could try buying Tower of Babel to encourage them, it really is good.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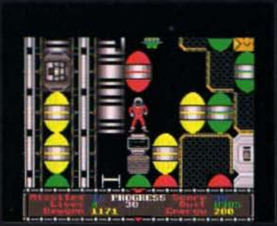

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Aggressor

... the alien down the chip shop

Price: £19.95
Supplier: Atomic, PO Box 118,
Peterborough PE1 5QH
Tel: 0733 53355
Requirements: Risc OS

ALIENS. They're nothing but trouble, are they? I mean, I bet that you've never heard of an alien race that, when they heard about humans actually said: "Well, these human mean us no harm, so we'll be really friendly."

Oh no. They all say: "Well these humans mean us no harm, so we'll completely annihilate them." What's wrong with us humans? OK, so we did bring the galaxy Jeremy Beadle, but accidents do happen.

As you may have already guessed, some nasty aliens have invaded Earth and have just about wiped out humanity. The bounders. But never fear, the 101 Aggressor Unit is here! Who?

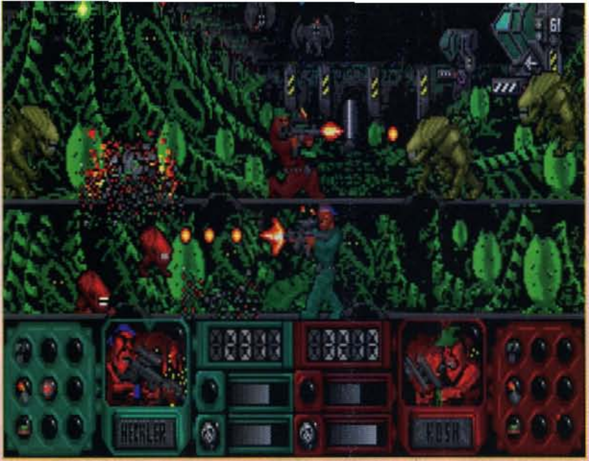
For some reason they are out in space while Earth is being made into an inter-galactic car park, but now they're back and they don't like aliens.

Aggressor is a sideways scrolling kill-'em-up, involving one or two players. You play Heckler or Kosh – sensitive parents – who get to go up against eight levels of aliens, bats, bakers and what seems to be a transformer.

They start the game with just (?) a 50 calibre machine gun that can wipe the smile off an alien's face faster than you can say Sigourney Weaver. Once on the second level, the boys are dropped supplies by parachute which include mines, grenades, kitchen sinks and flame throwers *(are you sure about the sink? - Ed.)*

The control system for your men is a little strange. They can jump, duck and fire as you would expect any commando to do. But if you are facing left and you press the Right key, your chap walks right without turning around – so he's walking backwards.

Yep, a separate button makes your man turn round. When first playing, it's difficult to adjust to this system and you end up moonwalking into the jaws of some alien.



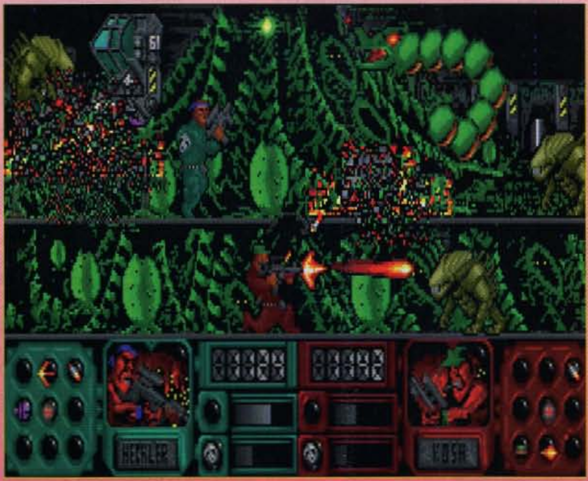
The boys on a nice day out

But once you've mastered the turning, it can be a pretty smart feature. You can walk right when an alien creeps up behind you so you turn around and walk backward without breaking your stride.

Then it's time to say: "Thanks for coming Mr Alien" and blow him away. And your guys are so agile that they can even somersault and roll backwards as well as forwards. Yes, it's hearty applause for the turning feature, folks. The graphics are very well done, adding to the atmosphere. Your animated characters are particularly lifelike, such as bracing themselves when they fire their gun or let loose with the kitchen sink.

The backgrounds are suitably moody and mysterious to make you remember the famous Aliens film.

One minor gripe is that the whole screen isn't used, only about two thirds, but this doesn't detract from the gameplay at all.



Oooh! What big teeth you have...

Sound has been used to the full to enhance the excitement. A haunting jungle-drum type beat is always present in the background. The aliens scream when killed, as do your men.

The gunshots are OK, but they're not exactly thrilling. In fact, there's always some sound to fill your ears, which makes a pleasant change for Arc games.

In two-player mode, the fun is doubled, as you have to work as a team, but you can also nick all the best power-ups, so you are in control of a death machine, while your (former) friend still has a pea shooter.

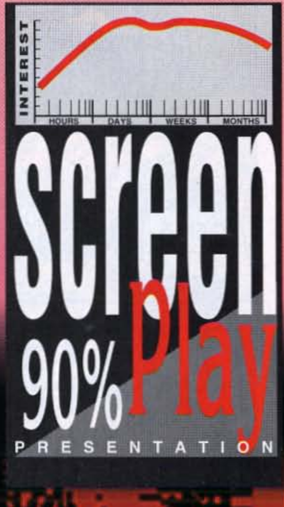
The entire game has been very professionally done. The writers, have coded demos before now, but this is their first full game. It comes on two discs, with no disc swapping after loading up.

The scenario is nothing new, but this style of gameplay has never been implemented on the Arc before and I have to say that the writers have created something that is really fun to play.

Overall, this should find its place in your collection. Its not the most dazzling thing you've ever seen, but it is different enough from other Arc games to merit buying. Admittedly the control system is a little difficult to get used to, but once this is mastered it's nothing but non-stop blasting.

Hang on. Where are the rest of the Unit? Are they back on the ship with their feet up, playing three-card brag for who gets your stamp collection? Never mind. I'm sure the boys will do you proud.

Ben Reilly



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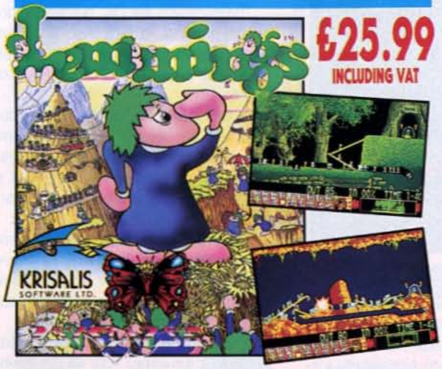
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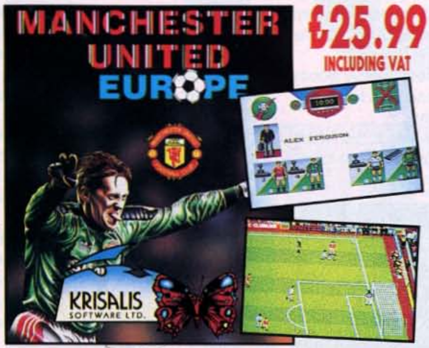
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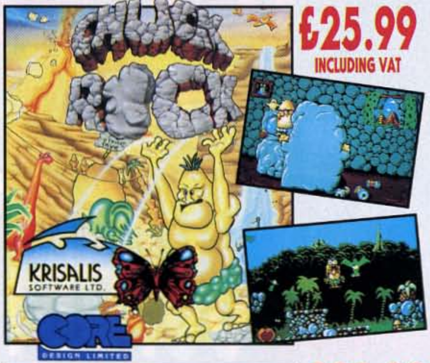
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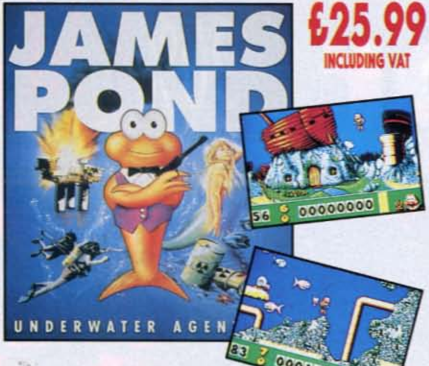
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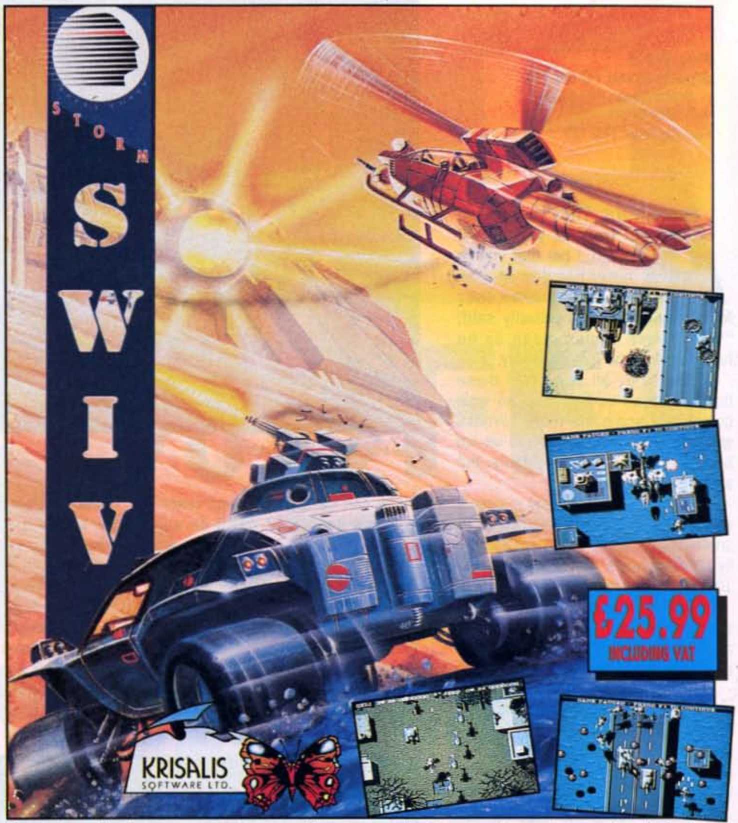
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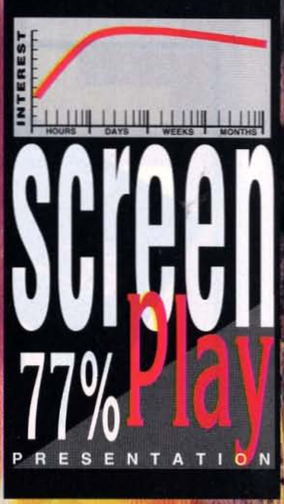
Dreadnoughts

... ironclad combat

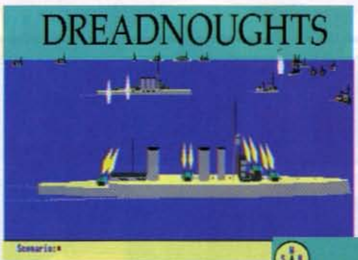
Price: £34.95 (Ironclads and Bismarck scenarios £16.95 each, full set of three £59.95)
Supplier: Turcan Research Systems Ltd., 83 Greencroft Gardens, London NW6 3LJ.
Tel: 071-625 8455
Requirements: Risc OS



THIS simulation, from the same stable as Waterloo, presents the excitement of the great sea battles of the late 19th and early to mid 20th centuries. Excitement? Definitely yes.

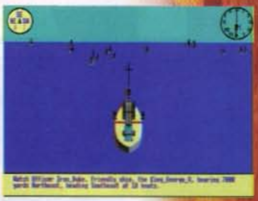
There you are, in charge of up to 150 ships, with only your telescope and reports via the radio to show you what's going on, trying to sink the ships of the other fleet, who may have a lot more firepower than you.

You can apply as much tactical skill as you can muster, but your opponent is thinking too. Double-clicking the Dreadnought icon takes you straight into the game, where you initially choose whether or not to play the simple Seatrial scenario. If not you select one of the others available. From there you select human and/or computer players for the two commanding officers.

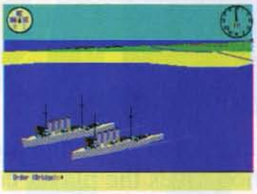


Scenario:

How it starts

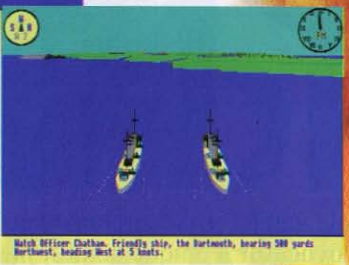


Let's be careful out there



Order (Bridge):

You can view the screen...



Watch Officer Chatham. Friendly ship, the Dartmouth, bearing 500 yards Northwest, heading West at 5 knots.

...from any angle

In the Seatrial each side has a squadron of four light cruisers of roughly equivalent strength. The German guns have slightly longer range, while the British guns have one level better armour penetration.

You can take the part of Admiral Sheldrake in charge of the British squadron or Admiral Tapken for the Germans, both or neither.

The British start at Portsmouth and the program is set to send them off on patrol into the Channel. The Germans are patrolling in the Channel and the two patrols will definitely intersect if you don't change the orders.

Each round of the simulation lasts six minutes and you can issue lots of orders on your go. You can get various forms of report back from the ships – such as their position and status, instruct them to take up various formations, build a command structure, set courses and speeds, arrange various emergency operations and, of course, attack.

Then the actions of the vessels are carried through in three separate divisions with fire and counter-fire taking place in each division.

Gunnery requires targeting and changes of direction upsets this but many sharp changes will reduce a ship's overall speed making it an easier target. For maximum efficiency all the available guns on each ship are targeted on one other vessel, although torpedoes can be fired at a different target.

It will certainly take several goes at the Seatrial before you manage to even dent your opposition. But it's worth practising before you go on to the more complex engagements.

In the major sea-battles, Jutland being the biggest, the use of squadrons and flotillas means that you can give orders to the flagship of the group and those instructions will be transferred, intelligently, to the other vessels.

You can give orders to individual ships but this can confuse the flagships, so all orders should follow the proper command channels.

Of course this adds time: One of the best, and most aggravating, features of the Peter Turcan's simulations is that the main reality of war, chaos, is accurately presented – you don't have a magic bird's eye view of the area, you only have the reports which become out of date.

If you have the misfortune to be killed aboard your vessel the computer continues the simulation. The only drawback with this is that once the computer is in full control, either because you decided not to play or because the flagship is disposed of, you can't break in and return to the Desktop, you have to reset the machine.

The packaging is a simple box with a nice colour picture. Inside you get one disc, a 96-page manual and a big fold-out sheet with the various sea charts on it. The sheet is plasticised so you can mark ship positions on it then wipe them off afterwards. The manual is divided into two sections, the first containing the usual Turcan detail on the history surrounding the simulation, it makes very good reading.

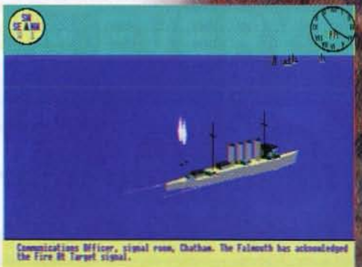
Section two is devoted to how you control the ships under your command. It's fairly simple but versatile and is easy to get used to.

There are four appendices covering recommended books for reading, warship classes used in the simulations, description of weapons and armour penetration tables.

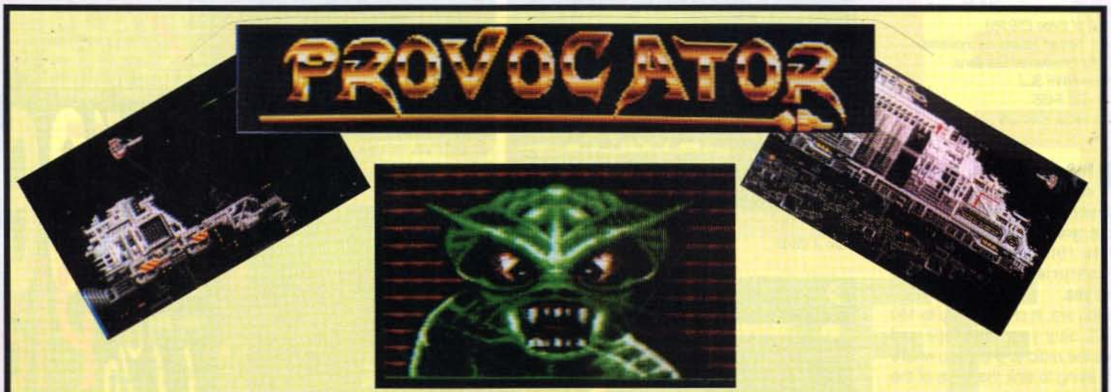
The last three are useful to determine relative strengths but there are notes on the scenarios and the charts that give a reasonable description anyway.

Dreadnoughts is an excellent simulation and although I haven't overcome anyone yet, with some cunning plan, I'm sure I'll manage it one of these days.

Petra Galloway



Communications Officer, signal room, Chatham. The Falmouth has acknowledged the Fire At Target signal.



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LET'S get down to brass tacks: This is a 16-bit conversion of one of the greatest – maybe even *the* greatest – vertically scrolling shoot-'em-ups. And it's brill.

When you boot up you're greeted with a superb piece of music that runs through all the between-play screens. There's a pretty nifty loading screen that sets the scene nicely and once it's all loaded some really nice graphics will keep you entertained for a while.

A screen shows how your chopper is built and armed, then there's one for the jeep and high score tables with interesting people on them.

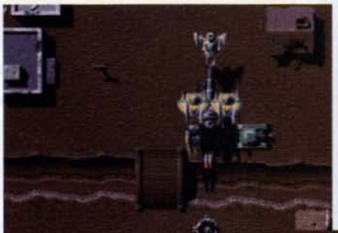
The control options are for keyboard and joystick, with the chopper or jeep being controlled by either. You can set the keyboard controls but you can't use the keypad – only the main keys, so it gets a bit cramped if you're playing the two player option.

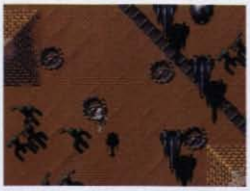
The chopper is dead easy to use, you can move up and down the screen, side to side and fire. It can only fire straight ahead unless you get one of the special power-ups. Auto-fire is provided if you hold the key down.

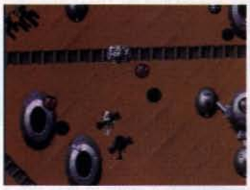
The chopper can fly over most things and its missiles will hit whatever they run into first whether it's on the ground or in the air. The chopper itself crashes into airborne things and flies over ground-based things.

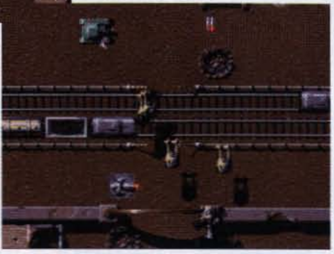
The jeep is really tricky. For a start it can't drive through buildings, walls, trees or any other solid scenery – big surprise, huh? But it fires in any of the eight directions you can drive in. Unless you're on auto-fire the gun keeps aiming the same way even if the jeep changes direction – with me?

So, you can fire sideways, backwards or wherever, while driving forwards which is really handy in some situations. Airborne nasties fly over the jeep while ground-based ones crash into it. 'Nuff said about that.


It's big and it's bad


They're leaving on jet planes

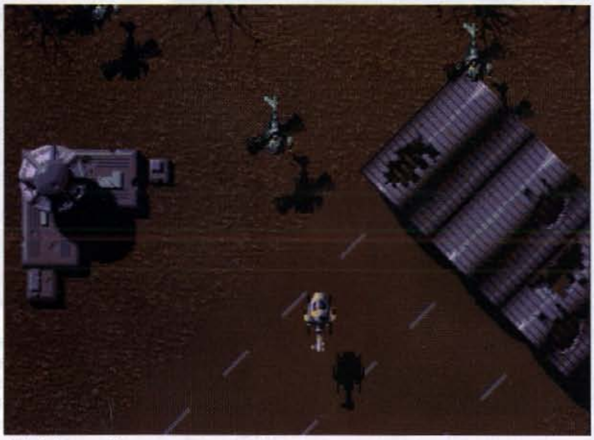

Don't shoot the floaters


Playing trains?

According to the blurb you're invading enemy territory to find out about all their super-new advanced weaponry, while making sure as little as possible is left moving when you've gone past.

So you start off flying over some buildings and trees as waves of enemy choppers start coming at you. Now these waves are the same each time so you can predict what's going to happen, but they don't necessarily start in the same place.

Next up are a couple of tanks that come in from the sides – but the choppers don't stop appearing. Then a train drives in from the side, and using it as cover another tank appears, then there's a whirring noise as an underground flamethrower emerges, and those choppers still keep coming in and ... get the idea?


This is the easy bit

Not everything you find is designed to blow you to bits. There are some round red things that, when shot, turn into shields. You fly into the shield and it will protect your vehicle for a while. If there are two of these things you can grab one shield and when you fly into the other it does a smart bomb. Or you can shoot the shield a lot and it smart bombs.

So what about the power-ups? Well you get those by blowing up the central body section of a rather large and unpleasant machine that flies on in pieces and assembles itself – while everything else is still going on! The problem is that the central body is protected by the rest of it and it's really difficult to hit.

The first time this monster appears there's a shield just appearing on the screen, so grab it and land yourself right over the central body and shoot a lot.

The thingy goes ka-bloom and leaves three tokens slowly floating down the screen. Shoot them and they change between options, run into them and you get the option displayed.

There are three basic types: Faster fire, more bullets per shot and several levels of fan-out – your bullets are fired in an arc which is dead handy for knocking out the really lethal stuff.

Now here's the real pain: If you're doing really well the program notices and throws more stuff at you. For example, if you're doing okay you might go over an area that seems bare apart from a homing-missile launcher. But do really well and the whole landscape turns into shrapnel mines, as well as the missile launcher. It ain't fair!

Overall measurement of how well you're doing is done by percentage: How much of the game you've finished. There's no breaks in this baby, you just play and play until your fingers drop off.

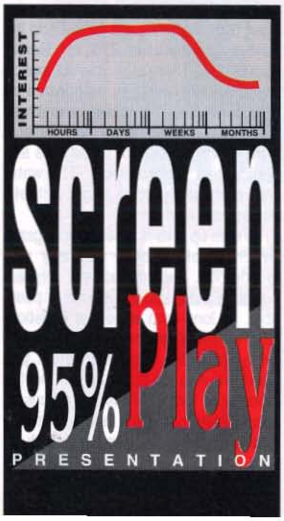
Except that around 25 per cent – and probably 50, 75 and 100 per cent – the scrolling stops as you meet a really big and nasty weapon system.

This thing has to be shot a lot before it blows up – very impressively – and it's essential to have the fan-out option with lots of bullets and rapid fire, because this unit keeps unloading homing-missile launchers which fire with unpleasant regularity.

So far I've got past this stage which marks the start of the military airport stage with lots more innovative baddies. After this you move out into a harbour which is as far as I've got and that's without the jeep – I hope it's amphibious.

This game is totally brill, and not too hard at the start so you can get to play more than 20 seconds before dying. It gets harder at a reasonable rate and has a real just-one-more-go addiction.

Geoff Brown



Cataclysm

think... or thwim

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1 Percy Street, Sheffield S3 8AU
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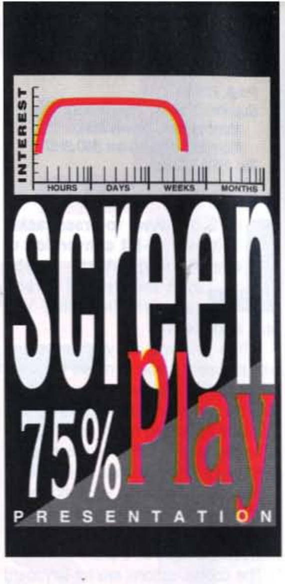
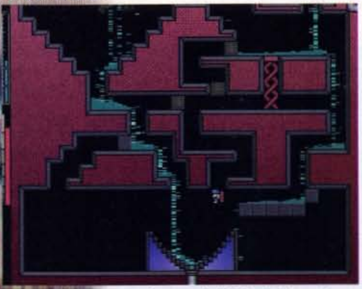
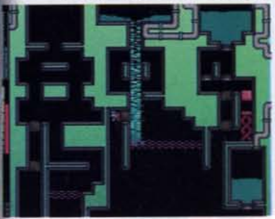


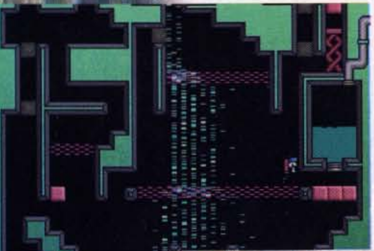

Someone's left the bath running...


Isn't anyone going to help?

WHAT we have here is a completely original game concept, in which the flow of water is accurately simulated. You play the *supervisor* of the submarine Orcna.

Fine, except that the Orcna shouldn't be a submarine, it should be a space ship which transports various alien species back to Earth for examination. You must have taken a wrong turn – I knew that we should have gone left at Alpha Centauri – and have crashed into the sea of a nearby planet.

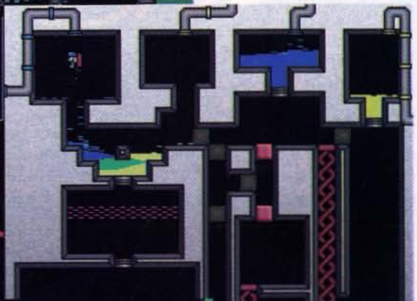
As the Orcna isn't designed for deep sea exploration it tends to leak like a sieve. The hull starts creaking and groaning with the massive pressure of the sea pushing against it. Someone has to stop the Orcna sinking by collecting and pumping out the water. That's your job, simple really – like an advanced plumbing simulator. If you collect enough water you complete the level – but beware of the time limit.


What a lot of drops

The play area is only about two screens high for each level and the water is usually pumped from the pipes at the top. Each level has a different layout and various problems to overcome.

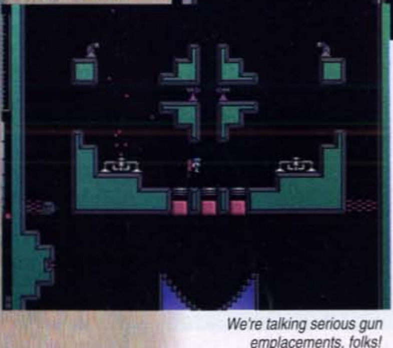
You can move anywhere because of your trusty thruster backpack and you have a supply of a few blocks.

You can drop and pick up these blocks at any time and they will stop the flow of the water, giving you the chance to make the water go down a certain route.


A touch of blue, a little yellow, et voila. C'est vert

There are other things to be found as well, such as weapons, sliding doors, dissolving blocks, valves, blocks that only let you through, blocks that only let water through and of course, the mandatory aliens.

Did I mention the aliens? Well they're pretty varied. Some are about as vicious as a bunny, while others regard you as dinner or target practice. But don't worry, because you can obtain some excellent weapons – the spray gun is fantastic. On first impressions, I was slightly disappointed with the game and after a few levels I became very frustrated, with the time running out really quickly. Then I realised that the more water you spilled, the quicker your time ran down. With that knowledge and a little lateral thinking I progressed quickly and the levels became enjoyable.


We're talking serious gun emplacements, folks!

On higher levels you have to collect acid or mix coloured liquids, which added another dimension and the game came into its own. By the way, the ship's computer has gone haywire, so its security systems are out to get you, spraying bullets hither and thither – as if there wasn't enough to worry about.

The game is by no means perfect, with simple graphics and poor sound – apart from the funky title tune – and the controls are the usual Z, X, /, ', Return and Space. There's no joystick option and the keys aren't as responsive as they could be. The screen sometimes juddered a little when too many objects were moving about but usually the animation was super smooth. The water was particularly good and it actually looked very realistic.

To sum up, this is an enjoyable game which employs both strategy and arcade play. The graphics are only fair, but quite cute, and the sound is passable. Its long-term appeal is questionable as there are only 40 levels and once you have completed them you won't want to do them again. On the other hand further levels are promised. Having said that, it will take you quite a time to complete the game. Good stuff.

Ben Reilly

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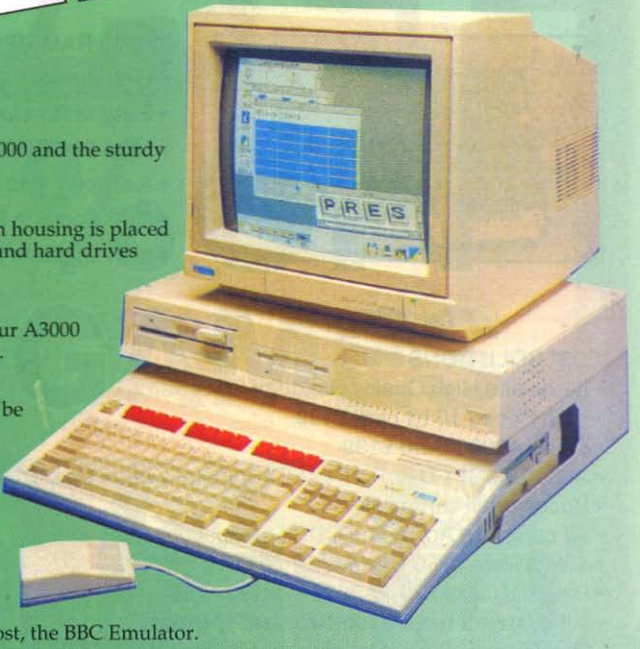

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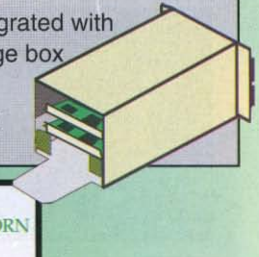

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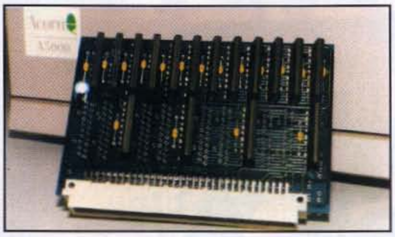

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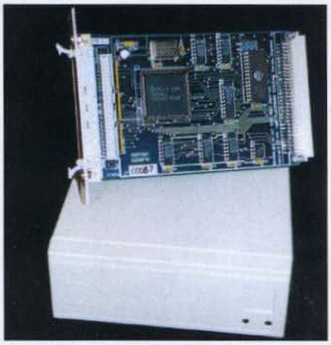

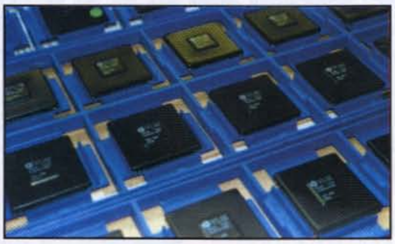

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Vertical Twist

Bruce Goatly takes you on a gentle excursion through his favourite topic

Fun with fonts

So far in this series we've considered text in general terms, as collections of words and paragraphs requiring styling, positioning and laying out in frames on the page. Now it's time to look much more closely at the fine details of the elements of text – the guises that individual letters can adopt.

The word font is often used without definition, so here's one to be going on with: *A set of letters, numbers and other characters with a distinctive appearance.* As far as it goes that will do, but it's broad, arguably inaccurate and not especially useful. Figure I should make things a little clearer, as the same characters are repeated in several different fonts.

The differences between Trinity Medium, Trinity Italic, Trinity Bold and Trinity Bold Italic are less than those between Trinity Medium and Homerton Medium or between Corpus Medium and Tamsin. Compare, too, the Trinity Italic letters with the Homerton Oblique, and their roman counterparts. Notice that the Trinity italics, and especially the small *a*, are designed differently from the Roman – upright – letters. But the Homerton obliques look like the Roman Homerton letters, only sloping.

Hamburger – Trinity Medium (roman)
Hamburger – Trinity Medium Italic
Hamburger – Trinity Bold (roman)
Hamburger – Trinity Bold Italic
Hamburger – Homerton Medium (roman)
Hamburger – Homerton Medium Oblique
Hamburger – Homerton Bold (roman)
Hamburger – Homerton Bold Oblique
Hamburger - Corpus Medium
Hamburger – Tamsin

Figure I: Two families and two single fonts

All the fonts called Trinity, for example, are regarded as a single family because they have overall similarities such as small ticks – called serifs – at the ends of lines, the same proportions between lower-case letters and capitals, similar letter shapes and so on. Fonts like Homerton, which lack serifs, are called sans serif fonts. Others, like Tamsin and FancyDress, are decorative and are usually used only in headings – not for whole books.

Serifed fonts come in several varieties, for instance the wedge-shaped serifs of Trinity and the slab serifs of French, with important implications for design work because the heavy slab serifs add impact rather than legibility. On the other hand a font such as Trinity, with its less pronounced serifs, is very legible in large quantities and is therefore widely used in books. Sans serif fonts are not as easy as serifed ones to read in bulk because there are fewer distinguishing features between letters, but they take reduction to small sizes better as they lack the fiddly bits of the serifs.

There are also fonts that don't contain normal alphabets, which are useful in technical work – maths and Greek, for instance – or for fancy items with their various symbols. Some of them are shown in Figure II. Many families of fonts are now available for the Archimedes.

What's in a name?

One thing to watch out for is the fact that, for copyright reasons, the fonts used on the Archimedes have different names from the originals on which they are based – Trinity is based on Times, Homerton on Helvetica, Corpus on Courier and so on. As a result, you may find fonts with different names looking almost identical. This is because they are based on the same font, but come from different suppliers.

Examples of such look-alikes are EFF_AG, AvantG and Vogue, which are designed from ITC Avant Garde Gothic. Then there's Michael, Pembroke and Paladin, which are variants of Palatino. The suppliers in question are the Electronic Font Foundry, Computer Concepts and Risc Developments respectively. EFF has the largest range of fonts, many of which are compatible with their PostScript equivalents – this is important if you intend to send your finished document to a professional bureau for printing, but isn't vital if you're going to print it yourself.

You can also get inexpensive fonts from many other places, too numerous to mention here. At the risk of sounding critical, I should mention a couple of points about *cheap* fonts. Some of the more dec-

αβχδεφγλπΔΠ⊥≅∃ – SymbolB
☎✔✘❄★✱❑❒❑◆➧ – Selwyn
❄✍✎✇✂✝✐✆☛✈ – Dingbats

Figure I: Technical and symbol fonts

KEY TIP

Easy Alt

Holding down Alt while typing space, 1, 2, 3, 9, 0, `, c, m, r, s, y, z, . or , usually produces special characters, and Shift+Alt+C gives the copyright sign – try it with the sample fonts.

➤

> *Text is more than just words and numbers, and there are many ways in which the printed word benefits from careful attention to detail*

	0	1	2	3	4	5	6	7	8	9
143				•	‘	’	‹	›	“	”
150	„	–	—	−	Œ	œ	†	‡	ﬁ	ﬂ
160		¡	¢	£	¤	¥	¦	§	¨	©
170	ª	«	¬	-	®	¯	°	±	²	³
180	´	µ	¶	·	¸	¹	º	»	¼	½
190	¾	¿	À	Á	Â	Ã	Ä	Å	Æ	Ç
200	È	É	Ê	Ë	Ì	Í	Î	Ï	Ð	Ñ
210	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û
220	Ü	Ý	Þ	ß	à	á	â	ã	ä	å
230	æ	ç	è	é	ê	ë	ì	í	î	ï
240	ð	ñ	ò	ó	ô	õ	ö	÷	ø	ù
250	ú	û	ü	ý	þ	ÿ				

Figure III: Characters 143 to 255 in Trinity Medium font

►

orative ones have been designed purely for the Archimedes and look good superficially. But they are rather uneven if you examine them closely and are really only suitable for headings. Other cheap or free fonts may be illegal conversions from copyright fonts on PCs or Macintoshes.

Either way, such fonts can have two drawbacks: Firstly, they usually lack the detailed hinting that makes the letters keep their shapes at small sizes. Secondly, they probably don't have the full set of characters, which will limit their usefulness. If in doubt, ask for printed samples.

Text is more than just words and numbers, and there are many ways in which the printed word benefits from careful attention to detail. The extra care you take may not be noticed consciously by your readers but it will improve readability, make the text more attractive or simply add an indefinable hint of quality to your work.

Many more characters are available than can be obtained by pressing the main block of keys on the keyboard – look in one of the appendixes in your User Guide for the character codes called Latin alphabet 1. Unfortunately the chart uses hexadecimal and binary notation, but almost all the keyboard characters lie between codes 32 and 126 inclusive, from space to ~. The others are code 163 (£) and 164 (¤).

Alt – who goes there?

All the characters that Acorn have defined from codes 143 to 255 – shown in Figure III – can be obtained from any program: Just hold down one of the Alt keys, type the character number on the numerical keypad – at the right of the keyboard – then let go of Alt.

If this results in numbers appearing rather than the required character, someone or some software has been naughty and you must reactivate a module in the computer so the Alt trick will work. Press function key F12 to summon the * prompt at the bottom of the screen and type:

```
RMReinit InternationalKeyboard
```

exactly as shown, in two words. Press Return after the command, and Return again to re-enter the Desktop.

The sample fonts on the demonstration disc have a few of these high-number characters so you can try them out on the Impression Junior demo. You can type the French word élève correctly if you spell it Alt233–l–Alt232–ve, and we'll meet some more specialised characters as we go along.

Check out our special reader offer on Bruce Goatly's book *DTP for All*

One of the traditional hallmarks of *real* printing was the use of ligatures – two characters combined into one. Sometimes used for technical reasons associated with printing, such as fi and fl – try them, they're codes 158 and 159 or language æ, œ, Æ and Œ – sometimes wrongly called diphthongs. œ is code 155 in the sample fonts. Nowadays they tend to be ignored and are unlikely to be noticed, but if you're a perfectionist you can derive some personal satisfaction from using them.

Another area of subtlety lies in the variety of dashes you can use – the one just there was an en dash – there's another. It's longer than a hyphen and is normally used with a space either side as a parenthesis. Try it out – it's code 151. Code 152 is an em dash, twice as long and now used rather rarely, and code 153 is a *real* minus sign with a built-in space on each side.

Quotable quotes

If you look closely at the text in *The Micro User* you will see that opening and closing quotation marks – ‘ and ’ – are different, unlike the vertical ' you get with the key next to Return. Similarly, double quotes – “ and ” – are different. Their codes are 144, 145, 148 and 149 respectively but Impression also uses Control+], Control+\, Shift+Control+] and Shift+Control+\ respectively. These shortcuts are handy if you can remember which is which.

Using such quote marks and apostrophes properly adds a touch of class to your printing and takes you beyond the merely adequate. In particular, many advertisements betray their DTP origins and let themselves down with a lack of attention to this detail.

To make life easier, most DTP software provides a facility for converting the single or double vertical quote marks automatically to *proper* quotes during the process of importing a text file into a document, though not while you are typing straight into a DTP document itself. No software is perfect, however, and it may not always make the right choice – check through afterwards for oddities like Saturn 4's or 'tis.

In Impression this facility is called Smart quotes and can be turned on or off from the Preferences dialogue box, which you can reach by clicking Menu on Impression's icon bar icon.

● *Next month we shall be looking at special effects with text and how these can be used to attract the readers attention.*

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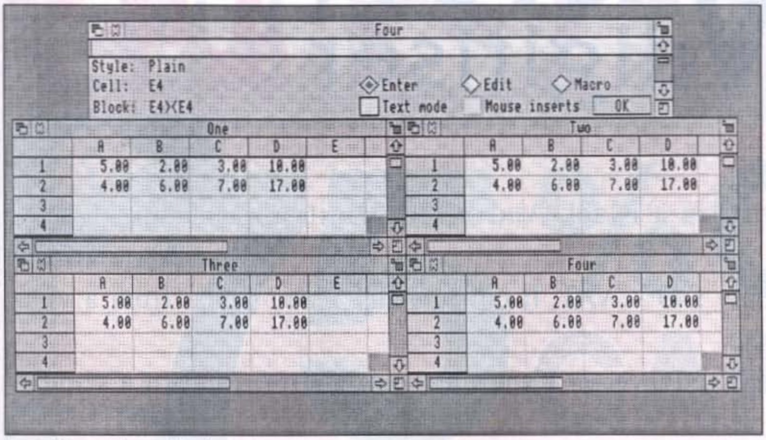

Four
Enter
Edit
Macro
Text mode
Mouse inserts
OK

Style: Plain
Cell: E4
Block: E4><E4

One

	A	B	C	D	E
1	5.00	2.00	3.00	10.00	
2	4.00	6.00	7.00	17.00	
3					
4					

Two

	A	B	C	D
1	5.00	2.00	3.00	10.00
2	4.00	6.00	7.00	17.00
3				
4				

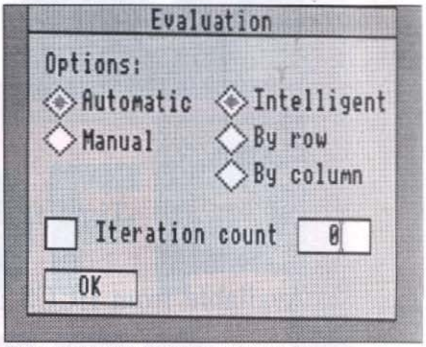
Three

	A	B	C	D	E
1	5.00	2.00	3.00	10.00	
2	4.00	6.00	7.00	17.00	
3					
4					

Four

	A	B	C	D
1	5.00	2.00	3.00	10.00
2	4.00	6.00	7.00	17.00
3				
4				

Figure I: Four small spreadsheets


Evaluation
OK

Options:

● Automatic ● Intelligent
○ Manual ○ By row
○ By column

☐ Iteration count 0

Figure III: Controlling the sheet evaluation method

Juggling rows and

Whenever you open a new spreadsheet in Schema it is automatically given a default logical name Untitledx – x being the number of spreadsheets that you have opened since loading the application. The very first thing that you should do on opening a spreadsheet is to give it a unique logical name.

This is especially true if you wish to refer to your spreadsheet from other spreadsheets, or if you have multiple spreadsheets loaded at the same time. Remembering that the easiest way of handling large amounts of data is to have small spreadsheets contained within a workspace, this logical name is the way you communicate between the various spreadsheets.

Figure I is an example of four very small spreadsheets. I have given each a unique logical name which appears in the title bar just above the column references B and C – One, Two, Three, Four. This is the name used to link data in different spreadsheets. You enter this name via the Menu-Misc-File-Name.

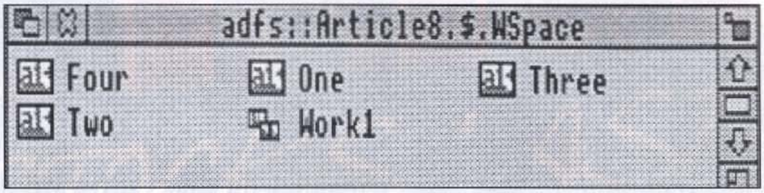

adfs::Article8.$.WSpace
Four
One
Three
Two
Work1

Figure II: The two types of Schema icon

Don't get this name confused with the physical name you give your spreadsheet or workspace which is the one used to locate the spreadsheet on the disc – the filename. The four spreadsheets appear to have the same information in cells A1><D2. If we display formula information (below) we see that they are quite different.

You should all be familiar with the contents of cells D1 and D2 in spreadsheet One – the SUM function, D1 being the addition of the contents of cells A1, B1 and C1.

Spreadsheet Two has formulae in each cell in the form !three.A1. This is how you reference a cell within another spreadsheet which is contained within the workspace. Spreadsheet Two in cell A1 therefore contains the contents of cell A1 of spreadsheet One. Similarly spreadsheet Three has the contents of Two cell A1 and Four has the contents of Three.A1 in cell A1.

Referencing other sheets

I have also included in cell D2 of spreadsheet Four a slightly different example. This reference shows that you are not limited to only defining a single cell to copy between different spreadsheets. SUM(!Three.A1><!Three.D2) in spreadsheet Four.D2 giving you the contents of cells A1+A2+B1+B2+C1+C2+D1+D2 in spreadsheet Three.

Figure II is a directory showing the two icon types used within Schema. One, Two, Three and Four are the spreadsheet icons and Work1 is the icon for a workspace. A complete workspace is saved via the iconbar menu or Shift+F3.

The method by which cells are updated is called Evaluation. Schema, once again, has plenty of options here for the way this updating is carried out.

One

A1:5	B1:2	C1:3	D1:SUM(A1><C1)
A2:4	B2:6	C2:7	D2:SUM(A2><C2)

Two

A1:!one.A1	B1:!one.B1	C1:!one.C1	D1:!one.D1
A2:!one.A2	B2:!one.B2	C2:!one.C2	D2:!one.D2

Three

A1:!two.A1	B1:!two.B1	C1:!two.C1	D1:!two.D1
A2:!two.A2	B2:!two.B2	C2:!two.C2	D2:!two.D2

Four

A1:!three.A1	B1:!three.B1	C1:!three.C1	D1:!three.D1
A2:!three.A2	B2:!three.B2	C2:!three.C2	D2:SUM(!Three.A1><!Three.D2)

Barry Mallet continues his series on making the most out of spreadsheets

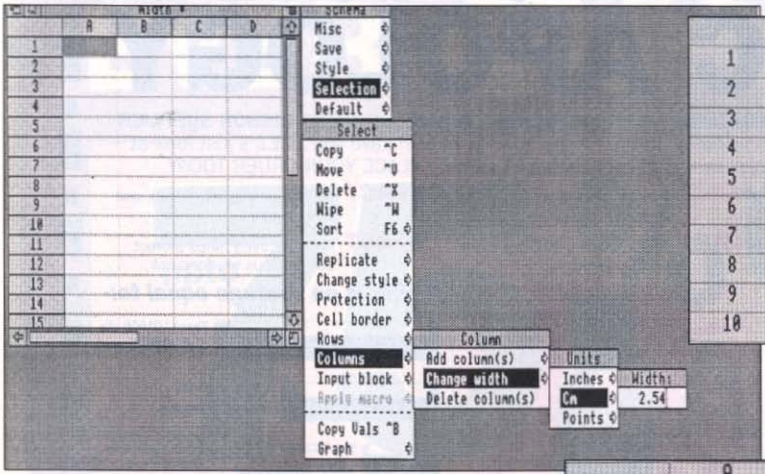
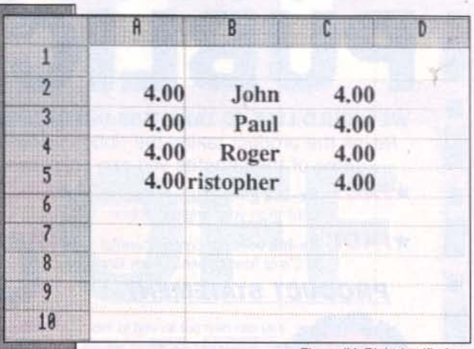
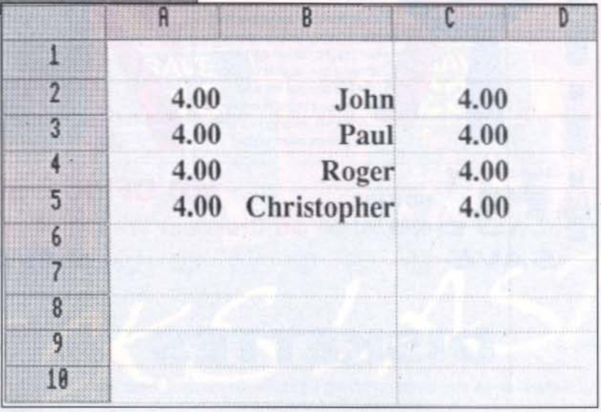


Figure IV: Changing width by menu



	A	B	C	D
1				
2	4.00	John	4.00	
3	4.00	Paul	4.00	
4	4.00	Roger	4.00	
5	4.00	ristopher	4.00	
6				
7				
8				
9				
10				

Figure IV: Right-justified text



	A	B	C	D
1				
2	4.00	John	4.00	
3	4.00	Paul	4.00	
4	4.00	Roger	4.00	
5	4.00	Christopher	4.00	
6				
7				
8				
9				
10				

Figure VI: The right-justified text in correct-sized cells

columns

The menu item can be found via Menu-Default-Evaluation.

If the Automatic option is selected evaluation is carried out when any new values or formulae are input. Manual mode requires the shortcut F7 key to be pressed before any evaluations take place. Intelligent mode means that the only cells to be evaluated are those directly or indirectly affected by the most recent command.

By row the cells are evaluated one after the other starting at row 1. By column the cells are evaluated one after the other starting at column A.

Intelligent evaluation

The default evaluation for all spreadsheets is the Automatic Intelligent mode. You may wish to change to manual mode if you find that automatic evaluation is slowing down your work. This can be useful on occasions when inputting a lot of data. The use of By column or By row is down to the specific characteristics of your spreadsheet. Doing it one way may produce a different result to the other – but it may not.

It might seem that using the Intelligent mode is the obvious choice and any method that re-evaluates the whole sheet is just a waste of time, but that's not necessarily the case. When using Intelligent mode the software has to trace to find which cells depend on the modified cell, then look further to see which depend on those.

If a spreadsheet has complex inter-relationships between its cells it may well turn out simpler – and faster – just to re-evaluate the whole thing, rather than spend time working out which cells have been affected by what.

The last item on this menu is the Iteration Count. It's a very useful feature for the advanced user who can specify the number of times he wishes the spreadsheet to be evaluated. This feature is especially handy for circular references and certain special formulae. The Escape key will abort a long re-evaluation.

Due to the many options available within Schema it is worth looking at the very many ways you can adjust the row height and column widths.

The width of a column will depend on the maximum information that you wish it to contain and also what font and size of font you require. The row height is really only determined by the font size. When you have completed your spreadsheet you may want to adjust both further to make the spreadsheet fit nicely on to a printed page.

By measurement

Variations in row height and column width can be accomplished by either adjusting a particular row or column individually or selecting the whole or part of a spreadsheet and adjusting them altogether. The menu option is Selection-Column(s)/Row(s)-Change width-Cm/Inches/Points.

Following this menu choice you are presented with a box which contains the last dimensional change made and you can either use this – if it is what you want – or delete it and type in your own measurement. I would recommend that you use inches or centimetres, as Points relates to the font height and width, including leading, which is somewhat difficult to work out for a particular typeface.

Column inches

Figure V is an example where placing a set of names in column B was alright until we came to Christopher (B5). Here the column was not wide enough, so via the menu we would have to choose Selection-Column(s)-Change width-Cm and insert 3 to get a column wide enough – 3cm – for Christopher to fit into. You can see this in Figure VI.

Don't forget that you have to select the column or row you wish to change before carrying out the adjustment. This is done by either selecting a cell in the required column or row, or by selecting the Alpha letters above the column, or numerals to the right of rows.

Should you want to adjust more than one row or column simply select the group and carry out the same Menu selection.

- *Next month we'll be continuing our look at manipulating rows and columns*

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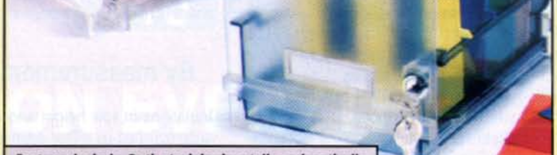

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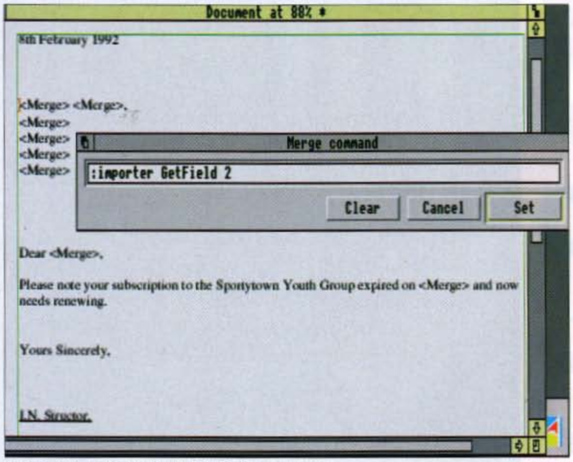


Document at 88% *
Merge command
Clear
Cancel
Set

8th February 1992

<Merge> <Merge>,
<Merge>
<Merge>
<Merge>
<Merge>

`:importer GetField 2`

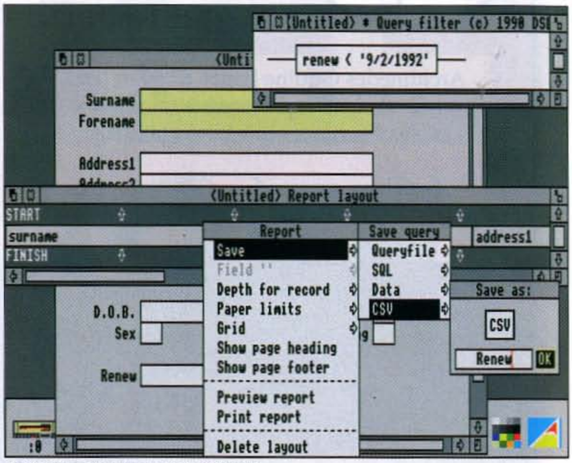
Dear <Merge>,

Please note your subscription to the Sportytown Youth Group expired on <Merge> and now needs renewing.

Yours Sincerely,

I.N. Structor.

An Impression document with Merge data command



(Untitled) * Query filter (c) 1990 DSI
(Unti
Surname
Forename
Address1
Address2
(Untitled) Report layout
START
surname
FINISH
address1
D.O.B.
Sex
Renew
Report
Save
Field ''
Depth for record
Paper limits
Grid
Show page heading
Show page footer
Preview report
Print report
Delete layout
Save query
Queryfile
SQL
Data
CSV
Save as:
CSV
OK

`renew < '9/2/1992'`

Save as: Renew

Saving the selected records in CSV form

Mixing and mat

DATABASES are generally used alongside other items of software. This month we'll see how data can be exchanged between different databases and between databases and other packages such as wordprocessors, graph plotters, spreadsheets and the like.

In practice the main way to transfer data is by saving a file from one application in a form that can be loaded by the second. By far the most useful file format is known as CSV. This stands for Comma Separated Values and is derived from spreadsheets.

In database terms this generally means that the resulting file has each field separated by a comma, with a carriage return or line feed after each record. Because the fields may themselves contain commas, each field is often surrounded by double quotes.

Got it tabbed

Another useful form is TSV, or Tab Separated Values. TSV files are similar to CSV ones except the values are separated by tab characters, that is Ascii 9 or Control+I. Often this format can be obtained by specifying the separator in the import or export dialogue box.

Files in these forms don't contain any of the information on how the database they hold is displayed on the screen, or any mathematical relationship between fields. However, they can be produced by most packages such as Squirrel, Junior Database and PipeDream.

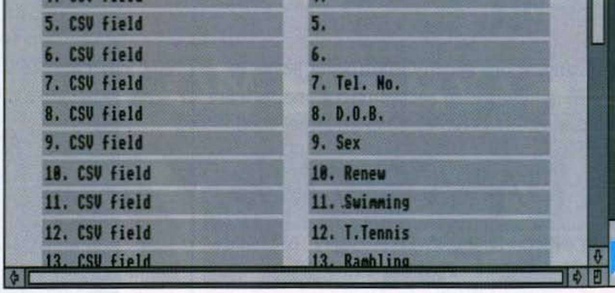
A CSV file can – depending on the package which produces it and the way it is used – be either the whole of a database or a selection of records. It may contain all the fields of the selected records or just some. In the December 1991 issue of *The Micro User* we saw how a CSV file could be selected from a Junior Database file and used as data by 1st Mail to personalise a 1st Word Plus letter. Impression users can use the Impulse system built-in from version 2.10 onwards to merge database data into a document.

To see how this is done we will go back to our database of Youth Group members held in the Squirrel database. Suppose we wish to use Impression to produce personalised reminder letters for members who are behind with their payments.

The first stage is to type the outline letter in Impression, leaving blank the points where data is to be supplied by Squirrel. Then the Squirrel database of members is opened and the Query window selected.

For each database field required in the letter the cursor is placed in the required position in the Impression document and the appropriate field dragged from the Squirrel window to the Impression one.

Depending on how the version of Impression is configured, a choice of loaders may be given which may cause the merge command to be transferred incorrectly. I found the LoadCSV loader – which is generally the first option – was the main culprit so it



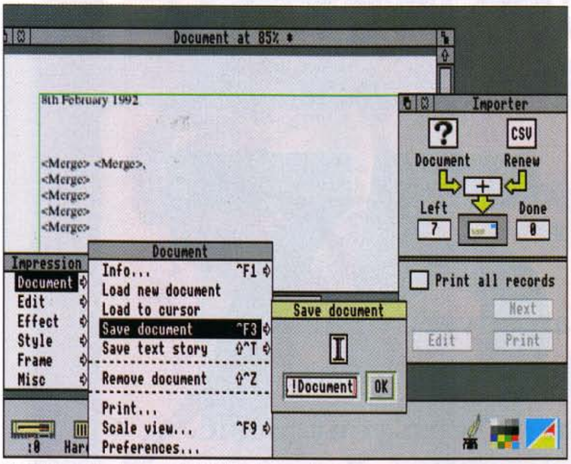
Map fields
Then press:
Go

If you want to alter this mapping,
drag the fields onto one another to swap them.

Copied from:	Copied to:
1. CSV field	1. Surname
2. CSV field	2. Forenames
3. CSV field	3. Address
4. CSV field	4.
5. CSV field	5.
6. CSV field	6.
7. CSV field	7. Tel. No.
8. CSV field	8. D.O.B.
9. CSV field	9. Sex
10. CSV field	10. Renew
11. CSV field	11. Swimming
12. CSV field	12. T.Tennis
13. CSV field	13. Rambling

A Junior Database import map showing the source and target fields

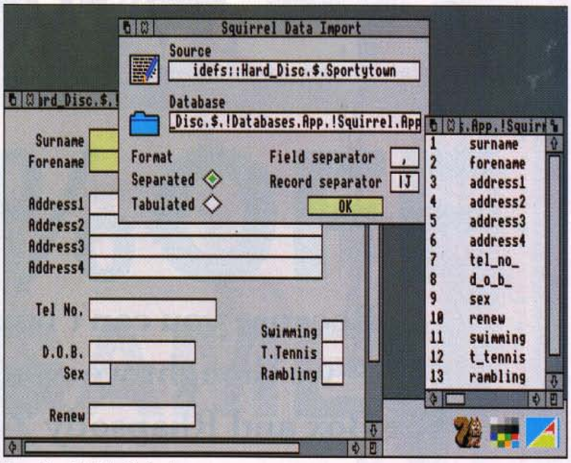
John Allen examines the techniques of information exchange


Document at 85% *
Importer
Document
Renew
Left 7
Done 0
☐ Print all records
Next
Edit
Print
Impression
Document
Edit
Effect
Style
Frame
Misc
Document
Info... ^F1
Load new document
Load to cursor
Save document ^F3
Save text story ⇧^T
Remove document ⇧^Z
Print...
Scale view... ^F9
Preferences...
Save document
!Document
OK
:0
Hard

8th February 1992

<Merge> <Merge>,
<Merge>
<Merge>
<Merge>
<Merge>

Running Importer to merge data for the document


Squirrel Data Import
Source
Database
Format
Separated ◆
Tabulated ◇
Field separator
Record separator
OK
Surname
Forename
Address1
Address2
Address3
Address4
Tel No.
D.O.B.
Sex
Renew
Swimming
T.Tennis
Rambling

Source: idefs::Hard_Disc.$.Sportytown

Database: _Disc.$.!Databases.App.!Squirrel.App

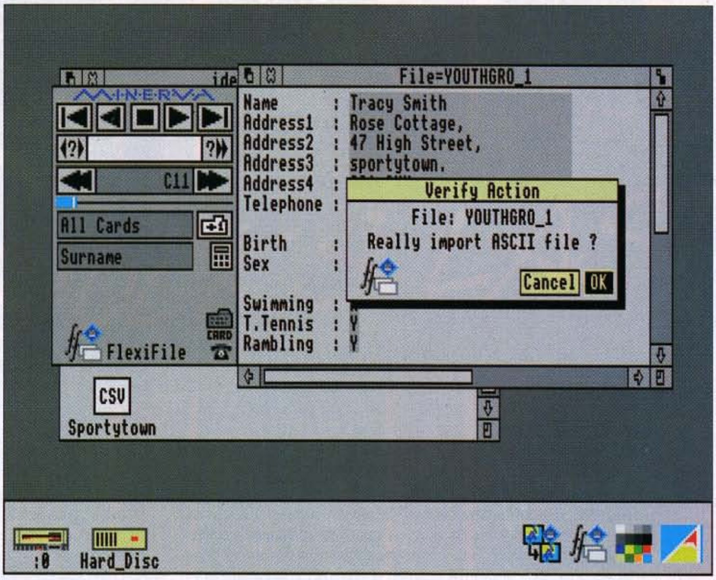
Field separator: ,

Record separator: 13

1 surname
2 forename
3 address1
4 address2
5 address3
6 address4
7 tel_no_
8 d_o_b_
9 sex
10 renew
11 swimming
12 t_tennis
13 rambling

Importing data into Squirrel

ching


MINERVA
All Cards
Surname
FlexiFile
CSV
Sportytown
:0
Hard_Disc

File=YOUTHGRO_1

Name : Tracy Smith
Address1 : Rose Cottage,
Address2 : 47 High Street,
Address3 : sportytown.
Address4 :
Telephone :
Birth :
Sex :
Swimming :
T.Tennis : Y
Rambling : Y

Verify Action

File: YOUTHGRO_1

Really import ASCII file ?

Cancel OK

Notice the differences with a Flexifile database import

is important not to load the merge instruction with it. The 1st Word Plus loader reads the data correctly and the commands will be alright if none of the loaders – found in Impression's Auto directory – is present.

The Squirrel query is then defined, so that only the data corresponding to members in arrears is supplied. This should be saved as a CSV file from the Report Layout menu.

The Importer program can then merge the two files and print the letters. This program is supplied as part of the Impression Business Pack and with other applications – such as Squirrel – that may need it. The CSV file icon is dragged on to the Datafile icon in the Importer window and the Impression document icon is dropped on to the Document icon.

A similar process can be followed to use any of the databases with Impression. Indeed the Importer program will merge any CSV file into an Impression document, provided that the appropriate merge command is inserted into the document. This will be along the lines of:

```
:Importer GetField X
```

where *X* is the number of the required field within the CSV file records.

In reality this method of mail-merging is not very different from the way files are merged into 1st Word Plus documents: Special commands are entered in 1st Word Plus and the document is merged with a CSV file by 1st Mail. The Impulse system does allow much more sophisticated use where external software – such as a database – can take complete control of Impression and this facility is exploited more fully by MultiStore.

While PipeDream will produce a CSV file which can be used with Importer or 1st Mail, owners are more likely to use PipeDream itself to write the letter. In this case the data file should be saved in Ascii format and its name given alongside the Fill from database option in the Print dialogue box.

Transferring databases

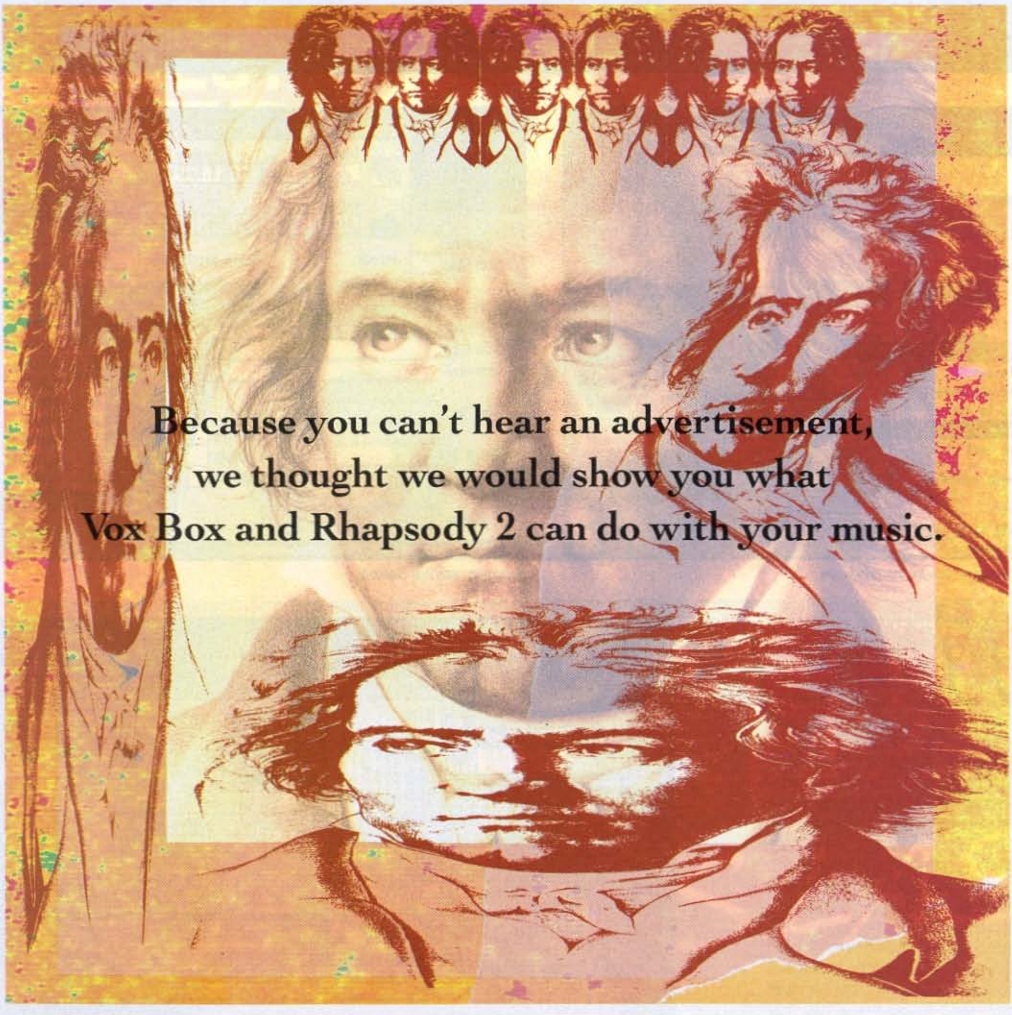
It is often the case that someone has data that you would like, but it is stored in a file for a different database package, which may even be on a different type of computer. Once again successfully transferring data to a new package generally uses a CSV or TSV format file as an intermediate step.

Usually an empty database has to be created in the new package and then the CSV file loaded into it. In Squirrel the data is placed in the newly created database with the SqlImport application. This is straightforward enough, allowing the order of the fields to be rearranged and extra fields added.

Likewise Junior Database will load comma- or tab-separated files into an empty database when such a file is dragged into the database window. Again fields do not have to match up.

For PipeDream, a file can be loaded using the appropriate option in the load window. Then the column widths can be adjusted and labels added before saving the file in PipeDream format.

Multistore and Flexifile can also import CSV and TSV into an existing database, by dragging the file's icon on to the add card icon in the tool pane. In this case, however, the field must be in the correct order in the file.


Because you can't hear an advertisement,
we thought we would show you what
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Vox Box and Rhapsody 2 really can enhance your music making. Rhapsody 2 is an improvement on the already successful Rhapsody music notation package. So, now you can do more than ever before. You can drag notes on to the score, transcribe triplets, capture notes in step time and effect MIDI program changes at the beginning or in the middle of a score. Just a few of the new and improved features that you'll discover.

Add to all that the Vox Box symphony of programs, a suite of four programs designed to compliment Rhapsody. There's Perform, which enables the user to play Rhapsody and MIDI files without the need to have Rhapsody present. Then there's Vox Beat which is primarily designed to provide facilities for a drum kit, providing a realistic accompaniment to a score. Vox Sample allows the user to convert sound samples from packages like Armadeus into useable Archimedes voices while Vox Synth will allow you to create Archimedes voices using digital synthesis.

What is more, Vox Synth allows waveforms to be drawn by hand. This means you can transform an existing piece of music into something completely different. Take a Beethoven Symphony, as the illustration suggests, you really can bend it, shape it, any way you want it.

All of this is simply the tip of the iceberg. Hopefully enough to whet your appetite.

So, please write to the address below for your Vox Box and Rhapsody 2 fact pack. It's certain to be music to your ears.

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Steve Bruntlett takes you step by step through an application

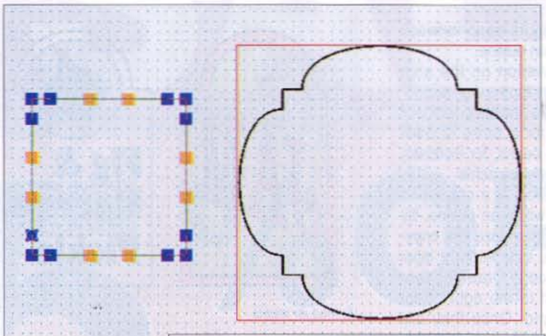
Signs of the times

USING only borders or frames and text we can create something useful. But how about designing some labels? There is a wide variety of purposes for labels – luggage, addresses, names and so on.

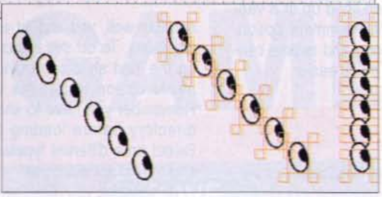
We're going to concentrate on the type you could use if you make your own jam, preserves or wine, as well as those for jars of pulses and spices and the general-purpose labels you might use to identify books, cassettes or records.

You can buy discs of ready-made borders in clip art form, but it's easy enough to create your own with a bit of patience and imagination. I'll take you through the creation of a couple of different types and look at the ways in which text can be used to make the labels look a bit more classy. Colour can also be used to improve the appearance of labels if you have access to a colour printer, though there's no reason why you shouldn't use a range of greys for emphasis and variety.

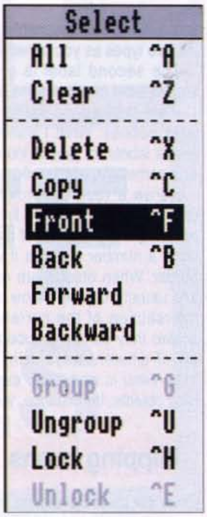
Photocopiable label sheets come in a variety of different shapes and sizes – there are A4 ones containing a dozen labels which are the right shape and size for jam jars and so on. You can use the smaller readily available address labels for thinner jars. Coloured, gummed paper can be bought from stationers or art shops.



Construction of a fancy wine label



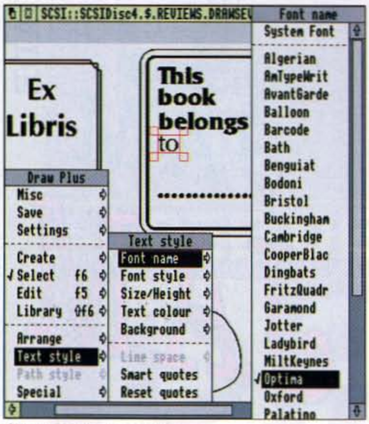
Aligning the beans


Select
All ^A
Clear ^Z
Delete ^X
Copy ^C
Front ^F
Back ^B
Forward
Backward
Group ^G
Ungroup ^U
Lock ^H
Unlock ^E

Sending an object to the front

Firstly you'll need a guidesheet. By copying your labels on to this you can ensure that your designs will be centred on the self-adhesive labels. Use a full centimetre setting on the gridlock to start with – to make measurement easier – and draw a series of vertical and horizontal lines corresponding to the label divisions. Print this on the same size paper as your label sheet and adjust the drawing until your lines are printed in the same place as the label divisions.

Centre your designs on these page sections or copy them from other drawings and reduce them to fit the label space if you have designed them larger than you need. When you print on the self-adhesive sheets your labels should be correctly aligned, but be sure to try them on plain paper first.

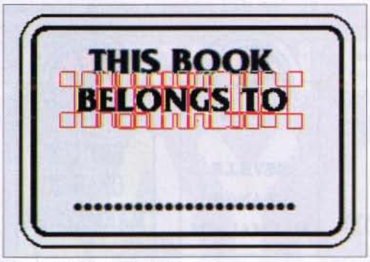

SCSI::SCSIDisc4.$.REVIEWS.DRAWSE
Ex Libris
This book belongs to
Draw Plus
Misc
Save
Settings
Create
√Select f6
Edit f5
Library ⇧f6
Arrange
Text style
Path style
Special
Text style
Font name
Font style
Size/Height
Text colour
Background
Line space
Smart quotes
Reset quotes
Font name
System Font
Algerian
AmTypeWrit
AvantGarde
Balloon
Barcode
Bath
Benguiat
Bodoni
Bristol
Buckingham
Cambridge
CooperBlac
Dingbats
FritzQuadr
Garamond
Jotter
Ladybird
MiltKeynes
√Optima
Oxford
Palatino

Changing fonts using Adjust

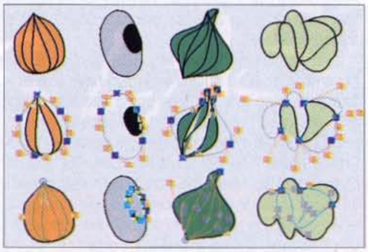
Down to business

The best way to start is to load your fonts and DrawPlus – or the A5000 version of Draw – then set the Screen setting to something fairly coarse like 0.25cm and the Lock setting to one which will give you an on-screen grid setting of a quarter of a centimetre to coincide with the gridlock when Auto Adjust is turned off.

You can draw your frames as large as you like at this stage reducing them to fit your available label size later. If you're happy working with this grid setting you can use the Save menu to save the New format with settings as the Default so that the Grid settings – as well as any others such as layer definitions – can be loaded automatically when you reload DrawPlus.


THIS BOOK
BELONGS TO

Ungrouped letter for kerning



Fruit and pulses' control points

The first panel of labels shows what you can do with five overlapped rectangles which have had a range of line thicknesses and fills applied to them and arranged in a different order to produce variations on a theme.

To move drawn objects into a different order, select the object and using the Select menu options of Front or Back, move it to the absolute front or back of a stack or Forward or Backward to move it one stage forward or backward. This gives you total control over object positioning and is well worth mastering.

The second set of labels is a bit more adventurous and uses a combination of straight and curved lines. You can construct your label outline in straight lines and then change some of them to curves by clicking on the control point at the end of the line with Adjust. Using the Edit menu select the Curved

➤

> *There is quite a lot you can do with seemingly plain text to liven up your labels after the text has been turned into graphics*

line option. It's reasonably easy to swap between the two types as you construct an outline.

The second label is a variation on the arch topped label and forms the basis for the Jam labels.

Plain outlines, no matter how intricate, are still plain outlines. What I wanted for a series of dried goods labels for jars of kidney beans, for instance, was something which reflected the contents.

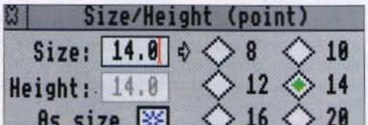
I drew a rough approximation of a chick pea using a series of curved lines within an outline. By reducing it to a quarter of its original size and copying it a number of times it was suitable for a label border. When objects are copied in DrawPlus they are usually copied below and to the right on an intersection of the current grid. Once they are copied they can be grouped and lined up in a variety of different ways using the Alignment option. This menu is well worth exploring and makes centring objects, for instance, very much easier.

Flipping beans

Once the rows are aligned either horizontally or vertically they can be moved to whatever spacing is needed, and flipping alternate beans in different directions at the same time gives a varied outline. Once you have a row of beans you can copy and flip it for a top or bottom row. You could chop a couple of beans off the end before rotating it through 90 degrees and copy and flip that row to give you top, bottom, left and right hand borders. Once you're happy with the arrangement these can be moved into position and grouped. The whole border can now be treated as a single graphics object and be scaled or rotated.

Text can be added in any size, font and style depending on what outline fonts you have available. The best thing to do is type some text into a label and see what it looks like. It will probably be too small if you have just used the Text option under the Create menu. The default is 10 point, but you can change this by using the Size/height option under the Text style menu. You can also use this option when the text is selected to change the size so you don't have to delete it and start again. Once the point size is set, it can be saved as one of the default settings.

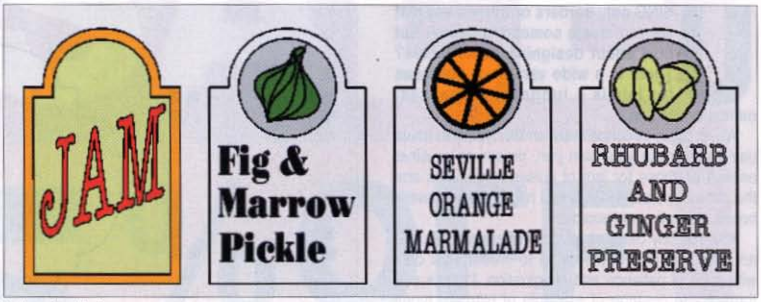
After you've adjusted the text size so it fits reasonably well, you should experiment with different typefaces. To do this select the piece of text, bring up the Text style sub-menu and click on the Font name option to get the list of installed fonts. Remember you have to show the Filer your !Fonts directory before loading DrawPlus. If you click Select on a different typeface your text will change and the list will disappear.



Size: 14.0

Height: 14.0

Adjusting text



Various jar labels

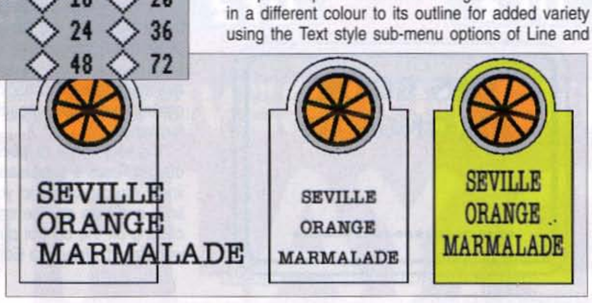
If, however, you click the Adjust button the list will stay in place allowing you to alter the text as many times as you like without the list disappearing every time. The use of the Adjust button in this way applies to all the other sub-menus of DrawPlus as well as all other – properly behaved – Risc OS programs. So try it and see how much easier it is when experimenting.

Jam tomorrow

Once the text is positioned correctly you may find some of the spaces between letters may not look quite right, such as the space between capital A and W. To adjust these use the Text to path option in the Special menu option. This changes the letters from text to their equivalent Draw versions. Now ungroup the text into individual letters, de-select them and then move them where necessary. Turn off gridlock completely or they'll move too far. Use the cursor keys to control fine movements.

There is quite a lot you can do with seemingly plain text to liven up your labels after the text has been turned into graphics. It's the first step in scaling, rotating, shearing, tilting and flipping text. You can scale normal text but that's about all.

Once text has been turned to graphics it looks dreadful as the computer no longer adds extra greys to make the edges look smooth. But this only applies to the screen display – it looks perfectly sharp when printed. If text is enlarged it can be filled in a different colour to its outline for added variety using the Text style sub-menu options of Line and Fill colour and Line width. You may find that to fit some long words, such as *marmalade* on to a label, you have to reduce the size to one you feel is too small to make any impact. You can, however, adjust text size independently in terms of height and width, so that small words which have horizontal restrictions in terms of the label width may not have any such restrictions in terms of height.

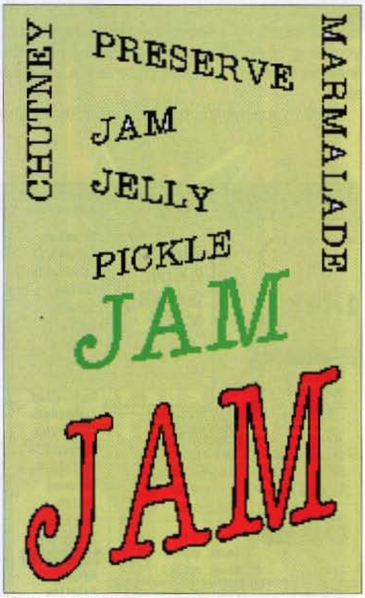


Adjusting text height and width

Use the Size/Height option under the Text style menu to change the point size of the text and turn off the As Size button to adjust the size of the height and width independently.

If you save your work every few minutes and keep experimenting using the above principles and guidelines you should end up with some well designed labels. You could even use the drawing of the computer, tackled in an earlier article, as part of an identification label to stick on your software. If you can get hold of some suitable clip art, experiment but don't forget to have a go at drawing or designing your own.

● *Next month we'll be moving on to 3D designing, looking in depth at packaging.*



Various text effects

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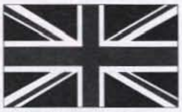

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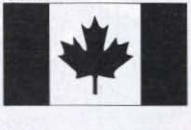

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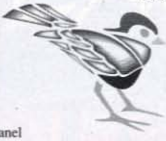

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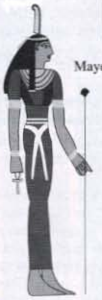

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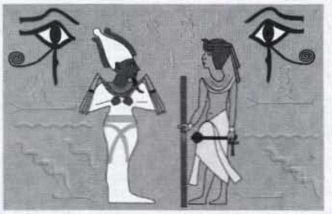

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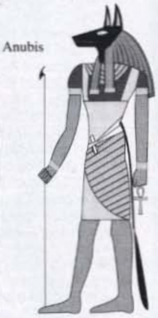

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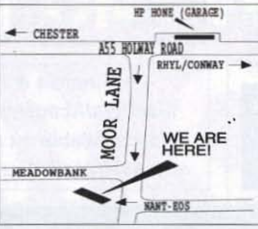

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For Archimedes IDE Hard Disc turn to page 14

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The card allows many of the peripherals developed for the BBC to be used with the Archimedes A3000. The ADC and User Port have the same pin out and connectors as the BBC computers.

Extensive RISC OS software is supplied to provide BBC OSBYTE calls for support of the ADC and User Ports, including the BASIC keyword ADVAL. The software provides extended RISC OS support for separate interrupts from both the ADC and User Ports, permitting easy interrupt driven operation.

The card is provided with all the software in ROM and is automatically loaded when the machine is turned on.

Peripherals connected to the ports can obtain up to 500mA of power at +5V. A fuse is fitted to the card to protect the A3000 from damage arising from accidental short circuit of the power output.

The card is provided with an extensive manual explaining installation, all software commands, connector pin outs, hardware addresses and example programs.

Features
- An 8 bit User Port with a standard 20 way IDC connector, compatible with the User Port on the BBC computers and the Archimedes I/O Podule.
- A 10 bit Analog to Digital Converter with a standard 15 way D type connector, compatible with the ADC on the BBC range of computers and the Archimedes I/O podule.
- An InterIC (IIC) Port with a 5 pin DIN socket to connect the A3000 to external IIC devices.

£42

Archi Mouse Port Splitter

Our handy little splitter unit eliminates the risk of damaging your micro due to constant plugging and unplugging of the mouse by allowing you to connect both, a joystick and a mouse simultaneously to your Archimedes. £15

Silicon Vision

Gerber Plot	£95	Solids Render	£120
Solid CAD	£120	Solid Tools	£279
Super Plot	£28	Data Vision	£110
Super Dump	£22	Share Holder	£135
Arc PCB Professional			£275
Realtime Solids Modeller			£136

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.
New RISC OS Version **Only £15**

Archimedes External Disc Drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. Fully Buffered Board. NO SOLDERING is involved. Supplied complete with necessary lead.
- A300/A3000 £21 • A400 £25

More Archimedes Products
See Pages 3, 5, 6, 8, 10, 14

LANGUAGES (Archimedes)

ISO-PASCAL; FORTRAN 77			£77 each
Assembler; LISP; Prolog X			£149 each
ANSI C Rel. 3	£125	BASIC Compiler	£77
Cambridge Pascal	£60	Logotron Logo	£45
Macro Assembler	£40	Risc Basic	£120
Robo Logo	£69	Risc FORTH	£110

NEW

256 Grey-Scale Scanner

Watford proudly introduces its new innovative 256 grey-level hand scanner for the Archimedes range of micros. It offers up to 400 dpi scanning resolution, complete with software.

256 Grey-Scale Scanner is ideal for incorporating pre-drawn logos, artwork, photographs and sketches into desktop publishing documents and other graphics programs. Designed by our own R & D team, it offers the best overall scanning solution for Archimedes micro. Just compare the competition on our price and these outstanding features:
- Full 105mm 400dpi scanning operation in just 3mS per line! (Twice as fast as most scanners.)
- Selectable 256/16/4 grey levels
- Full scan preview, scale to fit windows
- Complete set of image enhancement tools
- Single width podule
- True brightness and contrast control
- Fast RISC OS printing
- Five-function edge detection software, Laplace convolution matrix image enhancement, image smoothing, etc.

Special Launch Price
£185

ULTIMUM – Archimedes A3000 Podule Racking System

THE ONLY LOGICAL WAY TO EXPAND YOUR A3000 COMPUTER

Price: £149

Minerva's Archimedes Software

EasyWord	£18	Mailshot*	£27
Home Accounts	£35	Reporter*	£27
Time Tabler	£549	School Admin*	£65
System Delta	£59		
System Delta Program Reference Manual			£29

** Requires System Delta to operate*

Stand alone Business Accounts Packages
Sales; Purchase; Order Processing and Invoicing; Nominal; Stock management
£79 per module
or Complete Business Package **£325**

ARM 3 Turbo Card

Simply The Best

Here it is at last – the all new Mark 2 version of Watford's highly acclaimed ARM 3 processor board for the Archimedes and now also the A3000 series computers. Using the latest surface mount technology on a high quality four layer circuit board we have reduced the overall size to a mere 53mm x 45mm, and the cost to only £199. Mk II upgrade will increase the speed of your micro by a factor of 3 to 6.

Any competent A300 or A400/1 series micro owner can fit the upgrade himself, as we provide full fitting instructions and a special ARM chip extraction tool. However for A3000 micros and those not wishing to perform the upgrade themselves, we will collect, upgrade and return your micro by courier service, at an additional cost of £18.

(A300 and old A440 series owners please note – you will need to upgrade to MEMC1A for ARM3 to work.)

RRP £249

Offer Price £185

Acorn have satisfactorily evaluated Watford's ARM 3 upgrade and the A3000 upgrades are fitted by Acorn approved surface mount technology centre, therefore its fitment will not invalidate Acorn's warranty on the micro.

Continued→ → → → → → → → →

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£399**

FREE OFFER

A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

FREE with every BBC Master purchased from us during March

Add-Ons & Accessories

Econet Module for the Master	£45
Twin ROM Cartridge for Master	£9
Quad ROM Cartridge for Master	£14
Master Reference Manual I	(No VAT) £14
Master Reference Manual II	(No VAT) £14
Master Advance Ref Manual	(No VAT) £17
64K Upgrade Kit for B+	£32
Acorn 1772 DFS Kit complete	£49
ECONET Upgrade Kit for BBC B	£42
ALL ECONET UPGRADES Available	
ARIES' IEEE Interface for BBC B & Master	£238
Morley Teletext Adaptor with ATS Rom	£99
Ecolink	£270

Z88 Portable Micro

£179

FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

Z88 ACCESSORIES

• 32K RAM Pack or 32K EPROM Pack	£16		
• 128K RAM Pack or 128K EPROM Pack	£32		
• 512K RAM Pack	£86		
• Z88 Eprom Eraser Unit	£38		
• Z88 Spellmaster for Pipedream	£40		
• Z88 Carrying Case	£8		
• Z88 Computing Book	£9.95		
• AA Nicad Rechargeable Battery	£1.50		
• Battery Charger Compact & Fast	£6		
• Z88 Serial Printer Cable	£8		
• Z88 Parallel Printer Cable	£18		
• Z88 to Archi Link	£15		
• Z88 to BBC Link	£8	• Z BASE	£56
• Z88 to PC Link II	£27	• Z TAPE	£42
• Z88 to Macintosh	£32	• Z TERM	£42
• Z88 Mains Adaptor	£9	• Z88 Modem	£114

Archi Real-Time Digitiser

Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £139

A Set of Colour Filters for colour image grabbing using a video camera **£16**

Archi Graphic Tablet

The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic for use in Education).

(FREE this month, PC Mouse Drivers & Art package)

Special Price £175

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£15**

Archi Graphic Tablet Junior. Working area 9" x 6". Price includes Stylus **£110**

Disc Plonker Rack

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Acorn & Watford DFSs

• Watford sophisticated DFS ROM	£16.00
• Watford DFS Kit complete	£69.00
• We will exchange your existing ROM for Watford's ultimate DFS ROM at only	£12.00
• DFS Manual (comprehensive)	£6.95
• Acorn DNFS ROM	£17.00
• Acorn ADFS ROM only	£25.00
• Acorn 1772 DFS ROM Kit	£49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have replaced it with the their more up-to-date 1772 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1772 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

• SPECIAL PRICE	**£44.00**
• DDFS Manual	(No VAT) **£6.95**
• We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£30.00**

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – Diskettes

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

• *10 x 5.25" S/S D/D 40T (744)*	*£5*
• *10 x 5.25" D/S D/D 40T (745)*	*£5*
• *10 x 5.25" S/S D/D 80 Track (746)*	*£7*
• *10 x 5.25" D/S D/D 80 Track (747)*	*£7*
• *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	*£9*
• *10 x 3.5" S/S D/D 40/80 Track*	*£7*
• *10 x 3.5" D/S D/D 40/80 Track*	*£7*
• *10 x 3.5" Double Sided High Density*	*£13*

Top Quality 3.5" & 5.25" Diskettes

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

• *10 x **M3** 3.5" D/S D/D 80 Track*	*£7*
• *10 x **M9** 3.5" D/S High Density*	*£12*
• *10 x **M4** 5.25" S/S D/D 40 Track*	*£5*
• *10 x **M5** 5.25" D/S D/D 40 Track*	*£5*
• *10 x **M7** 5.25" D/S D/D 80 Track*	*£7*
• *10 x **M8** 5.25" D/S H/D Hi-Density*	*£9*
• ***M2** 3" Double Sided*	***£2.50** each*

VISA

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 250234 or 233383

Quality Disc Drives from Watford

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. All 5.25" Disc Drives are 40/80 track switchable. For ease of use, the switches are front mounted.

Various UK "manufacturers" of disc drives for the BBC Micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

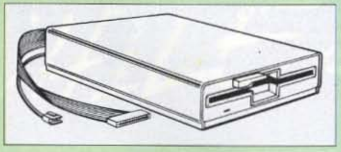
If you look around the popular BBC Micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

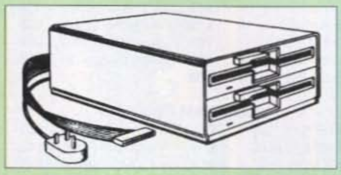
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. **Ideal for Schools & Colleges.**

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space. Your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double Plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 6th page of our advert for the Plinths).

P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is our special Compact Disc Drive cables designed by us.

"Test Bureau Approved for Use in Education"





Our Disc Drives conform to BS415

Type	Description	
	Disc Drive without PSU	
• CLS400S:	Single, 40/80 track 400K Double sided Drive	**£70**
• CLD800S:	Twin, 40/80 track, 800K Double sided Drives	**£138**
	Disc Drive with PSU	
• CS400S:	Single, 40/80 track, 400K Double sided Drive	**£80**
• CD800S:	Twin, 40/80 track, 800K Double sided Drives	**£153**

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

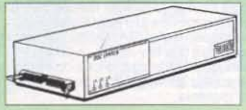
3.5" DISC DRIVE

These top quality 3.5" Double sided, 80 track, are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Type	Description	
	Disc Drive without PSU	
• CLS35:	Single Disc Drive, 400K	£62
• CLD400S:	Twin Disc Drives, 800K	£109
	Disc Drive with PSU	
• CS35:	Single Disc Drive, 400K	£83
• CD35:	Twin Disc Drives, 800K	£126

(P.S. CS35 is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage)

Disc Drive Sharer

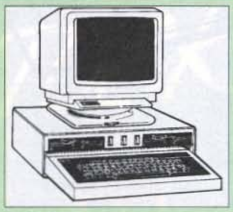


(Ideal for educational establishments)

A low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC Micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Price includes 3 Cables **£55**

Disc Drives in Monitor Stand



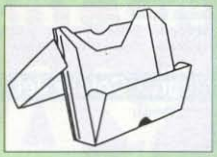
• CDPM 800S – Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

£165

• DP35 800 – Same as above except, one disc drive is a 5.25" and the other is 3.5".

£154

Plastic Library Cases



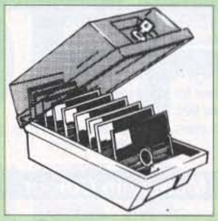
DLC1 – Holds 5 x 3.5" Discs.	£1.50
DLC2 – Holds 10 x 3.5" Discs.	£1.90
DLC3 – Holds 5 x 5.25" Discs.	£1.60
DLC4 – Holds 10 x 5.25" Discs.	£2.00

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of Cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Antistatic Lockable Disc Storage Units



Gives double protection – Strong plastic case that affords real protection to your discs.

Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.

Dividers and adhesive title strips are supplied for efficient filing of discs.

• **M35**	– holds up to 50 5.25" discs	£4.95
• **M85**	– holds up to 95 5.25" discs	£6.95
• **M25***	– holds up to 25 3.5" discs	£4.95
• **M50**	– holds 50 3.5" discs	£6.50
• **M100**	– holds 100 3.5" discs	£6.99
• **M10**	– holds 8 of No. 10 Data Cartridges	£15

* Not lockable

Dust Covers (For our Disc Drives)

Single CLS (without PSU)	£3.20
Single CS (with PSU)	£3.25
Twin CLD (without PSU)	£3.85
Twin CD (with PSU)	£3.90

Disc Albums

Attractively finished leather-look. PVC Vinyl

DW1 – Holds 6 x 3.5" Discs	£2.50
DW2 – Holds 6 x 5.25" Discs	£3.00
DW3 – Holds 20 x 5.25" Discs	£3.50
DW4 – Holds 40 x 3.5" Discs or 5.25" Discs	£4.50

Special Bulk Offer on Discs

(Supplied packed in Anti-Static Lockable
Storage Units)
(Lifetime warranty on Discs)

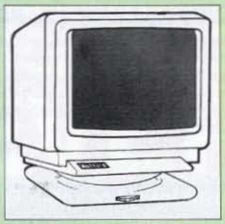
PRICES SLASHED

BULK PACK DISCS in lots of 100

Type	S/S 40T	D/S 40T	D/S 80T
• Without Sleeves 5.25"	£30	£35	£40
• With Sleeves 5.25"	£33	£38	£43
• 3.5" D/S D/D	£27 for 50		£49 for 100

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 250234 or 233383

Continued→ → → → → → → → →



Microvitec Monitors

• **1431** – Standard Resolution Monitor	£169
• **1451** – Medium Resolution Monitor	£209
• **Cub3000** Medium Res for A3000	£189
• **1441** – High Resolution Monitor	£359
• Dust Cover for Microvitecs	£5.50
• **Touchtec 501 Touch Screen**	£239

Now 3 years Parts & Labour warranty on all Microvitec Monitors

Multiscan Colour

• Eizo 9060S	**£389**	• NEC 6FG	**£1525**
• Eizo 9070S	**£579**	• Taxan 770LR	**£362**
• NEC 3FG	**£370**	• Taxan 775	**£362**
• NEC 4FG	**£465**	• Taxan 795	**£402**
• NEC 5FG	**£850**	• Taxan 875	**£685**
• VIDC Enhancer Board			**£25**

(We will supply the Watford's superior Multiscan VIDC Enhancer for Archimedes micro at only £10, if purchased with any Eizo or Taxan monitor.)

(P.S. Taxan 795 monitor is supplied with a FREE VIDC enhancer board)

Aries AlphaScan Monitor

Pound for Pound, the AlphaScan VGA Multiscan monitor provides the maximum performance and greatest flexlbility of any 14" colour monitor for the Archimedes micro.

Its multiscan circuitry provides automatic adjustment for frequencies between 30 and 60KHz horizontal, and 50 and 90Hz vertical. Its 0.28mm dot pitch high resolution tube provides super sharp text graphics, while a high speed (70/72Hz) refresh rate provides a flicker-free display easing the eye strain. The Multivideo VIDC Adaptor supplied (free) with the monitor allows high resolution operation in all screen modes.

£325

Philips Monitors

• **BM7502** 12" Hi-res Green Monitor	£67
• **CM8833** 14" Med. Res Colour Monitor	£167
• Dust Cover for Philips Monitors	£6

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £166

Spare Monitor Leads

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

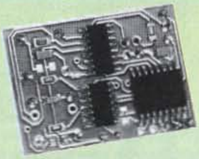
£12

Aries 2000 Colour Monitor

This attractively finished, etched screen medium res monitor is supplied complete with built-in speaker, volume control and video output. All controls are located on the front panel for ease of use. Ideal for BBC, BBC Master, Archimedes and Amiga.

A bargain at £159

Watford VIDC Enhancer



This unique VIDC add-on board for the Archimedes, caters for all types of Multiscan and VGA monitor and mode requirements. There are 2 versions to suit all requirements. The multimode software supplied, provides all the new modes for the selected monitor type, including the now standard Computer Concepts modes. With VGA monitor, you are no longer restricted to a few modes. A WIMP application supplied on disc, allows new modes to be designed and existing modes to be modified for particular monitors.

Super VGA VIDC Card: This provides support for both VGA and Multisync monitors. A unique electronic design allows the horizontal and vertical sync to be buffered and have the polarity changed under software control

£45

MultiVideo VIDC Card: As above but for MultiScan monitors only.

£25

Panasonic Printers

• KX-P1123	**£129**	• KX-P1654	*£335
• KX-P1124i	**£173**	• KX-P1695	**£272**
• KX-P1170	**£100**	• KX-P2624	*£295
• KX-P1624	**£272**	• KX-P2180	**£POA**

*** Price includes 12 months On-site warranty**

Cut Sheet Feeders

P36 – 1124/24i	£79	**P37** – 1123/70/80	£69
P38 – P1624/95; P2624			£129

Buffers

P12 4K Buffer Board for KX-P1081	£55
P14 32K Buffer P1123/24/70/80 P1540/92/95; P1624/54/95	£16

Serial Interfaces

P19 for P1123/24/24i/70/80/1624/54/95/2624	£49

Citizen Printers

• 120D Plus	**£100**	• Swift 9	**£129**
• 124D	**£145**	• Swift 24E#	**£249**
• 224	**£185**	• Swift 24X	**£299**
• PN-48	**£209**	• PN48 Ribbon	**£4**

FREE Colour Option with Swift 24E

• Swift 9 Colour Option		**£19**
• Swift 24 Colour Option		**£29**
• Swift 24 Ribbons	Black **£4**	Colour **£13**
• Citizen/Archimedes Colour Printer Driver		**£15**

Integrex Colour Jet

• Colour Jet 132 Printer	**£449**
• Paper Roll	**£6.50**
• BBC Screen Dump Software	**£10**
• Colour Cartridge	**£21**
• Black Cartridge	**£12.40**
• 100 A4 OHP transparencies	**£55**
• 8K Serial Interface Optional	**£123**
• Colour Jet 2000	**£POA**

Star Printers

• LC15	**£173**	• SJ48 Inkjet	**£174**
• LC20	**£100**	• XB24-200 Colour	**£295**
• LC24-10	**£133**	• XB24-250 Colour	**£355**
• LC24-15	**£240**	• XB24 Colour kit	**£29**
• LC24-200	**£164**	• ZA200 Colour	**£234**
• LC24-200 Colour	**£203**	• ZA250	**£297**
• LC200 Colour	**£143**		
• Star/Archimedes Colour Printer Driver			**£15**

Star Accessories

Cut Sheet Feeder

LC10/200/24-10	**£65**	LC15/LC24-15	**£125**
XB24-10	**£80**	XB24-15	**£139**

Serial Interfaces

8K Ser LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15	**£52**

Paper Roll Holders

LC-200; LC24-200; LC24-200 colour	**£29**

Buffers

32K Ram Card for LC/XB24-10; 15; LC200	**£55**

Ribbons

LC10; LC10-II; LC15	Black **£4**;	Colour **£6**
LC-200; LC24-200	Black **£5**;	Colour **£12**
XB24-10; XB24-15	Black **£5**;	Colour **£12**

Laser Printers

All Laser Printers include 12 months On-site maintenance

• Canon LBP-4+	4ppm	**£575**
• Canon LBP-8 III	8ppm	**£970**
• Canon LBP-8 IIIR	8ppm	**£1440**
• Canon LBP-8 IIIT	8ppm	**£1340**
• Epson EPL4100	6ppm	**£550**
• Epson EPL7500	6ppm	**£1159**
• Epson EPL8100		**£965**
• HP Laserjet IIP+		**£625**
• HP Laserjet III	8ppm	**£1015**
• HP Laserjet IIID	8ppm	**£1499**
• HP Laserjet IIIP	4ppm	**£695**
• HP Laserjet IIIsi	16ppm	**£2525**
• Panasonic KX-P4420	8ppm*	**£620**
• Panasonic KX-P4450i*	11ppm*	**£925**
• Panasonic KX-4455 Postscript	11ppm*	**£1450**
• Panasonic KX-P4430 Satin Print*		**£999**
• Star LP-8 III 2	8ppm	**£1249**
• Star LP-8 III	8ppm	**£910**
• Star LP-8 Star(post)script	8ppm	**£1140**
• Star LP-4	4ppm	**£565**
• Star LP-4PS Postscript	4ppm	**£779**

* Now with 2 years On-site warranty

Laser Toners

Canon 2, 3 & 4	**£46**	KX-P4420/50	**£19**
Epson GQ	**£13**	Laserjet HP IIP & IIIP	**£42**
EPL 4100	**£59**	Laserjet II/D, III/D	**£48**
EPL7100	**£82**	Qume Crystal (3)	**£58**
Star LP-8	**£56**		

Laser RAM Upgrades

• IIP & III 1MB	**£51**	• EPL7100 256K	**£39**
• IIP & III 2MB	**£88**	• GQ5000 512K	**£42**
• II & IID 1MB	**£64**	• KX4420/50 1M	**£75**
• II & IID 2MB	**£99**	• KX4420/50 2M	**£115**
• II & IID 4MB	**£146**	• KX4420/50 4M	**£195**
• Canon LBP4 1M	**£105**	• Star LP8 1M	**£139**
• Canon LBP8 2M	**£125**	• Star LP8 2M	**£275**

Laser Drum & Developer

• Epson Drum	GQ5000	**£93**	EPL7100	**£129**
• Panasonic 4420 Drum		**£60**	Developer	**£59**
• Panasonic 4450 Drum		**£93**	Developer	**£80**
• Qume Drum		**£76**	Developer	**£56**

Jetpage Postscript Cartridge

• HP IIP/III	**£225**	IID & IIID	**£227**

Various Add-Ons

• Laserjet Appletalk Interface	**£135**
• HP Adobe Postscript	**£399**
• Pacific Page Postscript	**£259**
• HP Premier Font Collection	**£28**
• Laserjet various Font cartridges	from **£45**

Hewlett-Packard Printers

• # Desk Jet 500	**£285**	• Paintjet XL	£1045
• Desk Jet 500 Col.	**£475**	• Quiet Jet Plus	£384
• Paint Jet Colour	**£430**	• HP Think Jet	£265

3 years extended Parts & Labour warranty £49

• DeskJet 500 Cart.	Black **£15;**	Colour	**£27**
• Paintjet Cartridges	Black **£19;**	Colour	**£25**

- Desk Jet 500 256K RAM cartridge £99
- HP Epson FX Emulation Cartridge for Desk Jet £59
- Desk Jet Unlimited (Book No VAT) £19.75

Canon Bubblejet Printers

	Printer	CSF	D'ble Bin	Ink Cart
BJ10EX	£183	£43		£16
BJ300	£289	£88	£65	£12
BJ330	£380	£110	£79	£12
BJC800C	£1549			

- Spare Battery pack for BJ10E £33

NEC Pinwriter Printers

• P20	**£180**	• P70	**£419**
• P30	**£240**	• P90	**£635**
• P60	**£330**		

- P60/70 Colour Option Kit £59
- Ribbons Black for P20/30 **£6** for P60/70/90 **£7**
- Ribbons for P60/70/90 Black **£9** Colour **£13.50**

Cut Sheet Feeders

P20 **£59;** P30 **£85;** P60 **£89;** P70/90 **£80**

Epson Printers

DFX5000	**£1079**	LQ1060 Colour	**£595**
DFX8000	**£1960**	LQ1070	**£315**
FX850	**£264**	LQ1170	**£437**
FX1050	**£336**	LQ2550+	**£675**
LQ100	**£159**	LX400	**£101**
LQ200	**£162**	LX850+	**£140**
LQ450	**£165**	LX1050	**£206**
LQ570	**£205**	SQ850	**£432**
LQ860 Colour	**£444**	SQ2550	**£625**
LQ870	**£368**		

Cut Sheet Feeders for

LX400/800/850/LQ400/500/550	**£69**
EX800/FX800/850/LQ800/850	**£130**
FX/LQ 1000/1050/SQ850	**£159**
LQ 2550 **£390** SQ2550	**£390**

Tractor Feed for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

Accessories

- EX800/1000 Colour Option **£45**
- EX800/1000 Colour Ribbon **£14**
- LQ2500 Colour Option **£65**
- Multifont Card for LQ550/850/1050 **£95**

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232 **£28** RS232 + 2K Buffer **£52**

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£4
IBM/Archimedes Parallel Lead 5 metres	£10
IBM/Archimedes Parallel Lead 10 metres	£15
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Concept Keyboards

Standard A3 Keyboard with BBC Software	£138
Standard A4 Keyboard with BBC Software	£109
Archi A3 Keyboard	£139
Archi A4 Keyboard	£110

Plotters

• HP7440AU	**£525**	• HP7475AU	**£715**

Roland Plotters

• DXY1100	**£490**	• DXY1200	**£620**
• DXY1300	**£825**	• DXY2500	**£2345**
• DXY3500	**£2955**	• Sketchmate	**£310**

- Roland plotter Pens, Fibre tip **£7.50**

Listing Paper (Perforated)

• 1,000 Sheets 9.5" x 11" Fanfold Paper	£7
• 2,000 Sheets 9.5" x 11" Fanfold Paper	£11
• 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold	£21
• 1,000 Sheets 15" x 11" Fanfold Paper	£9
• 2,000 Sheets 15" x 11" Fanfold Paper	£16
• 1,000 Sheets true A4 Fanfold Paper 70gms	£11
• 2,000 Sheets true A4 Fanfold Paper 70gms	£21
• Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£6.00
1,000 90 x 36mm (Twin Row)	£6.25
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.75

Laser Printer Labels on A4 Sheets

3750 70 x 29mm (3 Rows)	£13.50
3000 70 x 37mm (3 Rows)	£13.25
2625 70 x 42mm (3 Rows)	£13.00

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£2.75	£4.50
DMP2000	£2.75	£4.75
DMP4000	£3.75	£4.85
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£4.00	–
LX80/86/800/850	£2.75	£4.50
LX400	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£3.25	£4.75
Panasonic KX-P1124	£7.00	£5.00
Star LC24-10	£2.95	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£6	

Original Panasonic Ribbons

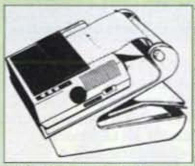
Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595 **£6**

P115 for KX-P1180	**£7**	**P145** for KX-P1124	**£7**
P140 for KX-P1540	**£8**	**P155** for KX-P1624	**£8**

Colour Ribbons for KX-P1081, 1592 & 1595
Brown, Blue or Red **£9 each**

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

80 Column version £24 (carr. £3)
132 Column version £29(carr. £4)

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 printers to 1 Micro with our combined, Sharer/Changer switch boxes.

Standard Low Cost Type

Connects	Serial	Parallel
• 2 to 1	£10	£11
• 3 to 1	£13	£14
• 4 to 1	£16	£17

Professional Type

Connects	Serial	Parallel
• 2 to 1	£17	£18
• 3 to 1	£22	£25
• 5 to 1	£34	£38

Cables extra at £6 each

2 Way Compact Printer Switch

A handy 2 way printer switch can be attached to the micro or monitor for ease of use.

• Centronics **£18;** • Serial **£17**
(Cables extra at £6 each)

Auto Printer Sharer Switch

Connects	Serial	Parallel
2 to 1	£40	£45
4 to 1	£62	£49
8 to 1	–	£89

256k Multi Spooler

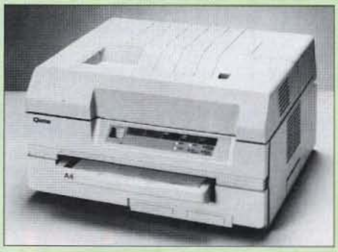
These Auto Parallel Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

• 2 In/2 out	**£135**	• 4 In/2 out	**£169**
• 8 In/1 out	**£199**		

Compact Converter Units

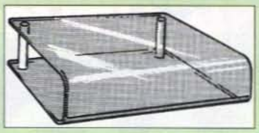
Serial to Parallel **£36** Parallel to Serial **£37**

Laser Direct



- Laser Direct Qume 6ppm complete **£749**
- Special High Res Card 600 DPI for Canon LPB 4 & LPB 8 Laser Printers **£315**
- LPB 4 Printer plus High Res Card **£875**
- LPB 8III Printer plus High Res Card **£1275**

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Continued→ → → → → → → → →

QUEST MOUSE Mk III

• Quest Mouse III & Quest Paint	£59
• Quest Mouse III, Quest Paint, AMX Stop Press & Pagefont	£89
• Quest Mouse III only	£30
• Quest Paint Software only	£34
• Quest Font Disc (22 Text Fonts)	£15
• Quest Mouse Mat (Red or Blue or Green please specify)	£3
• Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer	£18

(P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

ConQuest ROM Package £30

(Price includes software in ROM and a comprehensive Manual).

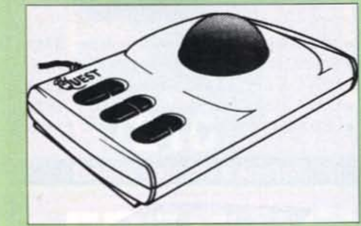
(Not Compatible with BBC Compact)

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £32

Quest – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version	**£25**
QT-20 Archimedes Version	**£26**

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£36
RB2 including Quest Paint	£69
RB2-A for Archimedes	£37

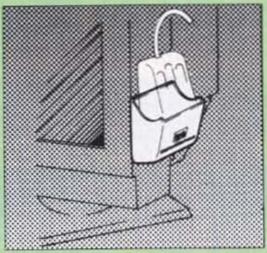
Mk III AMX MOUSE

• AMX Mouse plus Super Art £54

(Please specify for BBC, Master or Compact)

• AMX MOUSE ONLY	£29
• AMX SUPERART Package	£29
• AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£25
• PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
• AMX DESIGN (ROM)	£34
• AMX XAM Educational	£15
• AMX EXTRA EXTRA	£16
• MOUSE MAT	£3

WE Mouse House



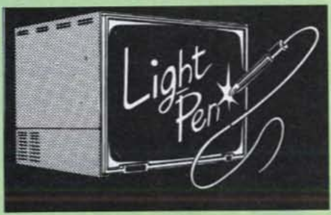
Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk.

It protects it from damage when not in use, yet within easy reach when you need it again. At £4 it does not cost a rodent's ransom.

Price £3

Mouse Cleaning Kit

To obtain trouble free operation and prolong the life of your mouse, the high tech rodent requires regular cleaning. Our deluxe mouse cleaning kit is ideal for the purpose £3



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £19

BEEB VIDEO DIGITISER

"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro. This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

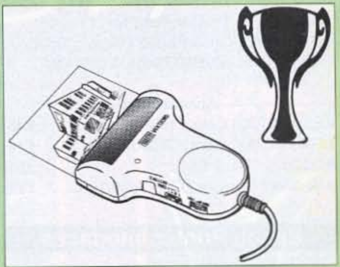
£99

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

Beeb Hand Scanner

Hand-held Scanner for the BBC Micro



HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs!

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware £115

WAPPING EDITOR
"MIGHTIER THAN THE QUILL"

Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individully proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack	**£59**
Wapping Editor plus Mouse	**£79**

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only).

£13

Archi A4 Scanner

This most advanced Archi A4 image scanner is supplied complete with ROM based podule software. Features provided include facilities for zooming in on an image and inverting the image in X and Y directions, saving and printing of the sprite created. Interactive help is supplied using the !HELP application on the Acorn applications discs.
The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.
Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.
Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.
All these features and facilities combine to make the Archi Page Scanner the fast and convenient way in which to add that extra impact, interest and clarity to documents, reports, instruction sheets, manuals, news letters, etc., from your Archimedes DTP package.

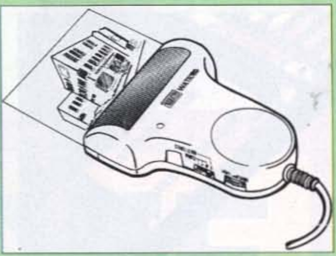
New Low Prices:

Archi A4 Scanner	£269
Sheet Feeder for above	£75
Scanner + Sheet Feeder	£359

Computer Concept Scanlight

• Scan-Light A4	£275
• Scan-Light A4 + Sheet Feeder	£368
• Scan-Light Junior mono	£130
• Scan-Light Junior 256	£197

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £149. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scaling to any size including stretching and squashing in X and Y direction separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

AHS-4 Archi 300/400 Version	**£119**
AHS-3 Archi A3000 Version	**£129**

Continued→ → → → → → → → →

Sideways ROM ZIF Socket System

Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B and B+ compatible.

ONLY **£18**

BBC B Low Profile Cartridge System

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

• Complete System	£11
• Spare Cartridges	£2.75
• Spare Rack	£1.65

ROM Cartridges for the BBC Master

Will also accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£8;** Quad **£13**

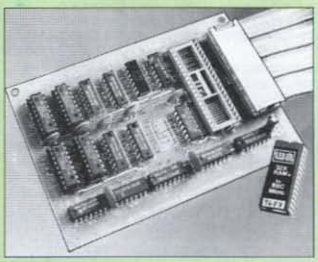
User Port Splitter Unit

User Port Splitter
A
B

Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22**

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

Simply plug the ribbon cable plug into the 6502 socket and gain a massive 32K of extra RAM.

- While word processing, you don't wait for a slow printer, type in text while printing and save on expensive printer buffers.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28K bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.
- Use the full 32k or the bottom 12K of the expansion RAM as a printer Buffer. (P.S. Only 12K printer buffer can be used with Wordwise & WW+, due to the way they are written).
- Unique facility to turn ROMs off and on again.

Only £54

(Price includes a comprehensive manual and the ROM)

NEW

Commander Joystick

Watford Electronics' new Commander Joystick for the BBC B and Master 128K has a unique dual mode of operation giving selective free floating or self centring fully variable control in both X and Y axis directions. Commander is particularly good for flight simulation and drawing programs.

Features:

- Direct connection to BBC Analogue input port – no interface needed.
- Fully compatible with all BBC Joystick controlled games programmes.
- Switchable springs allow selection of floating or centring operation.
- Trim adjusters for both X and Y axes for fine centre adjustment.
- Convenient stick mounted fire button with additional base buttons.

Price: £15

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£59**

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

SOLD OUT

Aries B-488 IEEE-488 Interface Unit

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238

Voltmace Joysticks

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7
Delta-Cat A mouse eliminator Joystick for the Archimedes	£24

Delta Base B

Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 £25

ROM/RAM Card

Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 9 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, Watford's ROM/RAM card.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

PRICES:

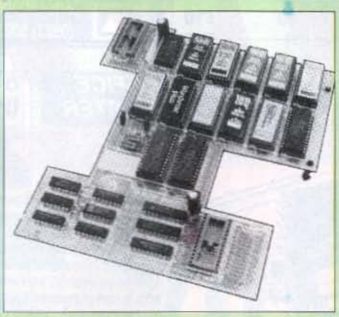
ROM/RAM card with 32k DRAM	£45
ROM/RAM card with 64k DRAM	£59
ROM/RAM card with a massive 128k DRAM	£99

OPTIONAL EXTRAS:

16k plug-in Static RAM kit	£8
16k DRAM for Upgrade	£13
Battery backup	£3
Read and Write protect switches	£2 each
Complete ROM-RAM card with all options fitted	£109

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 250234 or 233383

Solderless Sideways ROM Socket Board



The key features of this no fuss, easy to install card are:

- Increases your BBC Micro's ROM capacity from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8**

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

BBC Educational Software

Maths with a Story 1 (Disc). 4 primary level maths programs	£20.00
Maths with a Story 2 (Disc). 4 further maths programs.	£20.00
Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs.	£17.00
POLYMERS O-Level program.	£20.00
Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	£20.00
ADVANCED TELETEXT SYSTEM	£8.65
PERIOD TABLE SOFTWARE	£20.00
Computers at Work – Primary	£17.35
Electric Fields 6-14 years	£11.25
Espana Viva – 3 Discs	£19.95
WHITE KNIGHT Chess game	£16.00
A Vous La France	£29.00
FUN SCHOOL 2 – Red: Under 6 yrs	£12.00
FUN SCHOOL 2 – Green: 6-8 yrs	£12.25
FUN SCHOOL 2 – Blue: 8 yrs+ .	£12.50
FUN SCHOOL 3 – Red	£18.50
FUN SCHOOL 3 – Green	£18.50
FUN SCHOOL 3 – Blue	£18.50
Six French Games – Aimed at pupils in their first year of French, but also useful as revision for more advanced students 11 years+	£26
More French Games – Another 6 games 12 years+	£26
Au Restaurant and Accident de Route 12 years+	£26
Boulogne and Oh-Les – 2 programs for beginners	£26
Letters to French Penpals – 11 years+	£26
French Programs with Henri Beret – The programs in this series present vocabulary, grammar and role-play phrases in the form of animated games. 11-16	£22
Six German Games – Aimed at pupils in their first year, but useful as revision for more advanced student of German. 12 years+	£22
More German Games – Aimed at pupils in their 2nd year of learning German. 12 years+	£22
An Introduction to Electronics – Brings together all the basic electronics required for a GCSE Physics or CDT course. 14-16 years	£26
Computer Control – This is a package of 3 programs simulating control of a greenhouse, a robotic arm & a chemical plant. 14-16 years	£26
PUNCMAN Learning punctuation	
Puncman 1 & 2 for 7 – 13 years	£15
Puncman 3 & 4 for 8 – 14 years	£15
Puncman 5 & 6 for 8 – 15 years	£15
Yes Chancellor – A chance to take over number 11 at Downing Street. 12 years+	£18
Letters & Pictures – Introduces phonic skills to Infants 6-8 years	£15
Numbers & Pictures – Early number learning is a great fun (4-6 years)	£15
Note Invaders – Budding musicians can learn the notes on the Clef with this elegant game 3 programs (7 to Adults)	£15
Maps & landscapes No. 1 (9-14 years)	£18
Help Your Child learn Basic Map work No. 2 (9-14 years)	£18
Pirate – Educational Adventure (8-14 years)	£15
Spelling Week by Week (6-14 years)	£18

Archimedes Software

Animated Alphabet (3-6 yrs)	£21
Arcventure (8-12 yrs)	£29
Bookbinder	£43
Bumper Disc	£14
Bumper Disc 2	£14
Craftshop 1	£26
Craftshop 2	£26
Converta-Key	£16
Data Word	£16
Desktop Stories	£35
DigiSim	£35
Dream Time (5-7 yrs)	£23
Droom	£19
Farm (5-7 yrs)	£19
Fleet Street Phantom (9-13 yrs)	£25
Fun School 2A Red (up to 6 years)	£12
Fun School 2A Green (6-8 years)	£14
Fun School 2A Blue (8 years +)	£14
Gate Array Teaching System	£68
Glimpse Clip Art Utility (7-16 yrs)	£8
Highlighter (6-16 yrs)	£42
Jiglet	£27
Jigsaw	£28
Mapventure (9-13 yrs)	£24
Microbugs	£24
Money Matters	£16
Nature Park Adventure (7-9 yrs)	£27
Numerator	£60
Picture Book	£16
Recall (6-13 yrs)	£39
Sellardore Tales	£24
Snippet	£26
Space Mission Mada (9-13 yrs)	–
Sting of the Dump (9-13 yrs)	£22
Target Maths	£16
Viewpoints (9-12 yrs)	£33
Wizard's Revenge (7-10 yrs)	£17
Worst Witch (7-10 yrs)	£25

Continued→ → → → → → → → →

Computer Concept's ROMS

Communicator	£49
Disc Doctor	£18
Inter BASE	£49
Inter CHART	£25
Inter SHEET	£37
Inter WORD	£36
Mega-3 ROM	£76
Spell Master	£42
Wordwise	£24

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

Acorn ROMS

View 3.0 ROM	£45
Viewsheet (Acornsoft)	£36
Viewstore	£36
Viewspell with 80 track disc	£25
Viewplot Disc	£20
(Please specify for Master 128 or Compact)	
View-Index	£12
Hi-View	£38

MINI OFFICE II

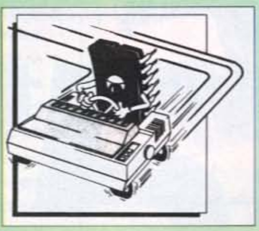
DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.00
DISC Version for the Compact	£18.00

(When ordering please specify for which Micro & 40 or 80 track Disc)

View Printer Driver Discs

Epson FX & RX 80	£10
Juki & Brother HR	£10

View Printer Driver ROM



View is a powerful word processor, but it seriously lacks in terms of printer driver support. With the View Printer Driver ROM, the View users will find themselves in the realms of advanced word processing.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £29

VISA

CREDIT CARD
24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

OFFICE MASTER

CentreSoft
Office Master

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

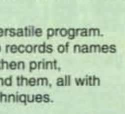
EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features

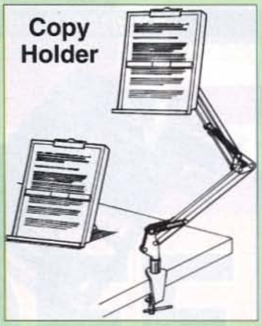
BEEBPLOT – Provides visual representation from Spreadsheet data.

Only £10 (Disc)

Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

Special Offer £14

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip.

Desk Top **£8**
Angle poise **£12**

NEW

Copy holders as above but with a battery operated, remote controlled cursor/ruler. (By hand or foot pedal.) (Batteries 2 x AA not included.)

Desk Top **£15**
Angle poise **£20**

The Epson RX/FX/KAGA Printer Commands Revealed Handbook

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£6.95
15 Hr Wordprocessing BBC/WW & WW+	£6.95
30 Hour BASIC (BBC Micro)	£12.95
1st Word Plus Rel. 2 Manual	£10.00
A3000 Technical Reference Manual	£29.00
Acorn DTP A Guide to	£17.00
Advanced User Guide for BBC	**£10.95**
Archimedes 1st Step – Beginners Guide	£9.95
Archimedes Assembly Language	£14.95
Archimedes BBC Basic Guide	£20
Archimedes DTP Manual	£10.00
Archimedes Operating System	£14.95
Archimedes Risc-Os Programmers Reference Manual	£79.00
Assembly Language Quick Ref.	£21.95
BASIC 2 – User Guide	£2
Basic V – A Dabhand Guide	£9.95
BBC Basic Guide (Archimedes)	£19.95
BBC Micro – Within the	£11.95
BBC B Micro User Guide	£15
BCPL User Guide	£9
C Big Red Book of	£8.95
C – A Dabhand Guide to	£14.95
C Programming Lang. 2nd Edition	£24.95
COMAL – Introduction to	£9.50
Deutsch Direkt! (Book only)	£5.95
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
FORTH on the BBC Micro	£9.95
ISO-PASCAL Reference Manual	£9.95
Master 512 Guide – Dabs Press	£9.95
Master Operating System	£12.95
Master Reference Manual Part 1	£14
Master Reference Manual Part 2	£14
Master Reference Manual – Advanced	£17
MINI OFFICE II – A Dabhand Guide	£9.95
Mouse User Guide to BBC Micro – the Complete	£5.95
Example Programs on Disc for above	£4.95
PASCAL Programming	£10.95
Risc OS Style Guide	£9.95
RISC Technical Manual 260 pg	£14.95
The Epson FX-KAGA PRINTER Commands REVEALED	**£5.95**
Understanding Interword – A Beginners Guide	£4.95
View 3.0 User Guide	£10
View Guide (View 2.1)	£5.00
View, Viewsheet & Viewstore – Mastering	£12.95
VIEW Dabhand Guide	£12.95
Viewsheet User Guide	£10
Viewstore User Guide	£10
Z88 – A Dabhand Guide	£14.95
Z88 Computing	£9.95
Z88 Magic	£14.95

BOOKS for IBM PC & Compatibles

1-2-3 For Business	£25.95
1-2-3 Mastering Release 3	£22.95
1-2-3 Mastering – 2nd Ed.	£22.95
1-2-3 Quick Reference	£8.45
1-2-3 Using – Rel. 3	£25.95
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8086/8088 Programming the	£17.95
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Autocad – Inside 6th Ed	£36.95
Autocad – Mastering Through Rel II	£28.95
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C Programming Language 2nd Ed	£26.95
C – Teach Yourself	£19.95
Clipper – Using 2nd Ed	£22.95
Computer Users Dictionary	£9.95
Corel Draw 2nd Ed Mastering	£26.50
Corel Draw Quick Ref Thro V1.2	£7.95
Corel Draw made easy	£19.95
Corel Draw v2 Quick Ref	£8.45
dBase 3/4 Complete Ref	£27.45
dBase III Plus – Complete Reference	£19.95
dBase III Plus Handbook 2nd Edition	£22.95
dBase Instant Reference (III & III+)	£10.95
dBase 4 – Handbook	£21.95
Desk Jet Unlimited	£19.95
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DOS Instant Ref.	£9.75
DOS Instant Reference (up to 3.3)	£6.95
DOS Power Tools	£46.45
DOS – Programmers Ref. Manual 2nd Ed	£25.95
Excel for Windows – Quick Ref.	£8.95
Fax – Management with	£7.95
FAX – Managing with	£12.95
Framework III – Mastering	£24.50
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Hard Disc Instant Ref	£10.95
Hard Disc management – Quick Reference Guide to	£4.95
Hard Disc – Using Your	£27.45
IBM PC & PS/2 – Inside the 3rd Ed	£21.70
Microsoft GW BASIC	£17.95
Microsoft Windows 3 – Using 2nd Ed	£20.95
Microsoft Windows Illustrated	£21.95
Microsoft Word 5.5 – Using	£20.45
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MS-DOS Bible 3rd Edition	£22.95
MS-DOS First Book	£15.50
MS DOS for Beginners	£17.45
MS-DOS Quick Ref Guide 5	£8.95
MS-DOS – Running 4th edition	£19.95
MS-DOS – Supercharging 2nd Edition	£17.95
MS-DOS Users Guide 3rd Edition	£27.95
MS-DOS – Using	£21.95
MS-DOS 5 – Quick Start	£18.45
MS-DOS 5 User Hand Book	£19.95
MS-DOS 5 – Upgrading to	£14.95
MS-DOS 5 Using	£29.95
MS-DOS Tricks & Tips	£16.45
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Norton Utilities – Inside the	£21.75
Novell Network – Mastering	£27.95
Novell Network – The ABC of	£21.95
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Pagemaker – Using	£22.95
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Quatro Pro Quick Ref.	£8.45
Smart – Using	£21.45
Smartware II – Mastering	£22.95
Smartware II – Using	£27.45
Smart, tips, tricks and traps (QUE)	£22.95
Supercalc 5 – Using	£27.45
Supercalc Professional	£17.95
Symphony Made Easy	£15.95
Symphony – Using Special Ed.	£27.45
Symphony 4th Edition – Mastering	£24.95
Turbo C Bible	£27.95
Turbo C++	£22.95
Turbo Pascal 5 – Using	£22.95
Turbo Pascal Using	£27.45
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Ventura Mastering – 2nd Ed.	£22.95
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Ventura – 3rd Edition	£24.95
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Window 3.0 Programming	£27.95
Window 3.0 Quick Ref.	£7.95
Word for Windows made easy	£15.95
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Wordperfect – Illustrated	£21.95
Wordperfect 5 – Using	£22.95
Wordperfect – Quick Reference V5	£8.45
Wordperfect 5.1 – ABC's of	£18.95
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Carriage on Books vary between £2 to £4.00, depending on their weight

New Release

ACORN TO PC

Stop the Confusion!

Do you have to use both Acorn computers and PC's? Would you like to use your Archimedes or A3000 in PC-emulation mode but are unsure of the new commands?

Although Acorn machines (such as the BBC B, the Master, the Archimedes and the BBC A3000) are mainly used in education, most commercial computers use other operating systems, particularly MS-DOS. As a result school computer users are at a disadvantage when moving into 'business' computing. PCs and other commercial computers use MS-DOS as the operating system, so commands for formatting, copying, backing up, printing and the modem are not the same. Even file names are written differently! And did you know that there is one Acorn command which, if used in MS-DOS, wipes everything in the current directory?

'ACORN TO PC' enables you to change over painlessly. It shows clearly and quicly how, why and where the two systems (Acorn and MS-DOS) differ. As with a foreign language dictionary, you can use the book to transfer either way – from Acorn to MS-DOS, or from MS-DOS to Acorn.

'ACORN TO PC' also acts as a handy reference guide to all Acorn star commands and their MS-DOS equivalents. It also has an extensive and readable explanation of the directory tree and hierarchical filing systems in general. Both DFS and ADFS Acorn systems are covered.

'ACORN TO PC' is written clearly and concisely by Dr. John Lockley, who has wide experience of writing and broadcasting. He is currently appearing as a regular contributor on Radio 5, and is co-author of 'The Complete BBC Computer User Handbook'.

Price: £12.95 (No VAT)

The Complete BBC Computer User Handbook

If you own a BBC B, B+, Electron, Master 128 or Master Compact, or Archimedes, then this is the book for you. It shows how to get the best from your machine, and how to make it work for you. The general style and level of presentation means that both the expert and beginner alike will feel comfortable with the quality and quantity of the material.

Subjects covered include the general use of computers, hardware design and peripheral devices like printers, disc drives, etc, and Networking. Programming hints and tips and various disciplines for making a better program are discussed in some detail, including debugging of specific errors. Standard programs are covered, such as wordprocessors, spreadsheets, databases, graphics, communications, etc., which brings you neatly on to the subject of using computers in the office or at work – even giving advice on writing and marketing your own programs.

A book you will enjoy to use as a reference, or read from cover to cover, over and over.

Only: **£14.95** (No VAT)

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

Beeb PC (BASIC)

Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed.

Beeb PC (BASIC) automates many of these changes, and will convert majority of BBC statements that are invalid for IBM BASIC into equivalent acceptable statements. In addition BBC BASIC data files can be converted to IBM BASIC format, with support provided for all BBC data formats:- INTEGER, REAL & STRING.

Price: £38

Beeb DOS 3.0

(Now reads Archimedes Discs)

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

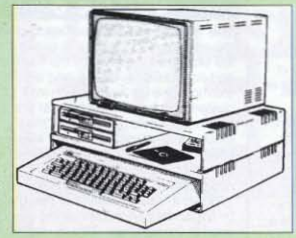
Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual. (Will only work on 360K Disk Drives & read only ADFS and Watford DDFS – not DFS).

Price: £39

(Please write in for technical literature)

Continued→ → → → → →

Plinths for the BBC B & Master 128K Micros



Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationery. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	**£13**
Double BBC Plinth	420 x 310 x 210mm	**£24**
Single Master Plinth	490 x 310 x 105mm	**£14**
Double Master Plinth	490 x 310 x 210mm	**£26**

(Carr. Single plinth £2; double plinth £3)

ADDER

SOLD OUT

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: 2516, 2716, 2532, 2732, 2764, 27128, & 27256.

£55 (£5 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast.

- **ERASER EB** – Standard version erases up to 16 chips. **£34**
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£36**
- Spare UV tubes. **£12**

ROM Extraction Tool

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip. **£2**

Metal Chip Extractor **£3**

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 250234 or 233383

Servisol Foam Cleaner

This king size multipurpose foam cleaner spray is ideal for cleaning Keyboard, Monitor, Disc Drive & Computer furniture surfaces.

£2.50

Antistatic Aerosol Spray

Ideal for cleaning and preventing static build-up on TV/Monitor Screens.

£2.50

Aerosol Dust Spray

Ideal for removing dust & dirt from Keyboard & similar inaccessible spaces. **£3**

PC Cleaning Kit

To avoid data corruption and trouble free use of your PCs, it is advisable to clean your PC System once a week. Our Kit 14 is ideal for the purpose. **Kit 14** – 1 each, 3.5" & 5.25" Cleaning Disk, 2 cleaning pads; Drive head cleaning fluid; 20pcs general purpose wipes; Anti-static screen cleaning fluid; General surface cleaning fluid and a transparent plastic case which can hold ten 5.25" Disks when empty. **£10**

Spares for BBC Micro

UHF Modulator	**£4**	16MHz Crystal	**£2**
Speaker Grill	**£1**	17.734 MHz Xtal	**£2**
Speaker	**£3**	32.768MHz Xtal	**£1**
Keyswitch	**£1.50**	BBC B Refurbish	
Master PSU	**£59**	Casing	**£25**
Master Keyboard	**£62**	Keyboard	**£46**
Master Casing	**£49**	Power Supply	**£59**

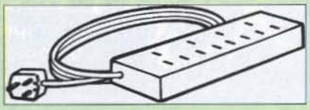
Replacement Flexible 17 way Keyboard Connector **£4**

Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage translent spikes/surges caused by lightening or thermostats switching.

Protection for only **£8.50**

4 Way Mains Distribution Socket



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals.

£9.50

Aries Spike Cleaner Unit

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System

£16

28pin DIL Header Plug

SOLDER type **£1.50** IDC CRIMP type **£1.95**

8 Way DIP Switch

Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ keyboard

Only **£1.00**

28 pin ZIF SOCKET (Textool) **£6.95**

SIMs & SIPs

• 256 x 9-8	**£11**	• 1Mb x 9-10	**£28**
• 1Mb x 9-8	**£39**		

Connecting Leads

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 3 pin DIN Plug + 1 Jack Plug	**£2.50**
to 7 pin DIN Plug	**£3.00**
to 3 Jack Plugs	**£2.50**
6 pin DIN to 6 pin DIN Plug (RGB)	**£3.00**

Disc Drive Power Leads

Supply from BBC power supply to standard Disc Drive Connection: Single **£3.00**; Dual **£3.75**

Disc Drive Interface Leads

BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

Miscellaneous Connectors

	Plugs	Sockets
RGB (6 PIN DIN)	**50p**	**75p**
RS423 (5 pin Domino)	**70p**	**80p**
Cassette (7 pin DIN)	**40p**	**95p**
ECONET (5 pin DIN)	**35p**	**50p**
Paddles (15 pin 'D')	**150p**	**250p**
Disc Drive Plug 4 way	**100p**	–
6 way Power Connector	**120p**	**150p**

Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

£14

Watford POWER DUCK **£8**

CHIP SHOP

1 MB-10 DIL D-RAM	**£4.50**
1 MB ZIF D-RAM	**£4.00**
256K x 4-8 DIP	**£4.75**
256K x 4-8 ZIF	**£4.00**
DS3691	**£4.50**
DS88LS120	**£5.25**
LM324	**£0.45**
SN76489	**£5.50**
SAA5050	**£8.75**
UPD7002	**£6.00**
2764-250nS	**£3.00**
27128A-250nS (12V5)	**£2.50**
27128-250nS (21V)	**£4.00**
27256-2	**£3.00**
27512-2	**£4.50**
27C101G (1 Meg)	**£7.00**
4013	**75p**
4020	**£1.00**
4164-10	**£1.55**
4464-10	**£3.50**
4816 RAM	**£2.00**
41256-8	**£2.00**
41256-10	**£1.50**
6264LP-8K	**£4.00**
6502A CPU	**£5.00**
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65C12	**£9.00**
6512A	**£10.00**
6522	**£4.00**
6522A	**£5.00**
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6845SP	**£6.00**
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7438	**50p**
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74LS04	**50p**
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74LS123	**£1.00**
74LS163	**£1.00**
74LS244	**£1.00**
74LS245	**£1.00**
74ALS245	**£2.75**
74LS373	**£1.00**
74LS393	**£1.00**
75453	**£1.00**
75159	**£3.00**
8271	**£49**
9637	**£2.00**
ICL7673PA	**£3.00**

Assorted ROMS

ACORN ADFS	**£25**
ACORN BASIC 2 plus User Guide	**£22**
Acorn BCPL	**£42**
ACORN DNFS	**£17**
Acorn FORTH	**£32**
Acorn Graphics	**£25**
Acornsoft C Disc	**£36**
Acorn LISP	**£19**
Acorn OS B+	**£25**
Acorn OS 1.2	**£14**
Basic Editor	**£24**
BBC PCB Designer	**£49**
Beebmon	**£22**
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Communicator	**£49**
Dump Out 3	**£25**
EPSON NLQ ROM	**£25**
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GXR-B	**£21**
GXR-B+	**£22**
Logotron LOGO	**£43**
MASTER OS ROM	**£38**
Master ULA (47)	**£15**
Master ULA (60)	**£10**
Micro Prolog	**£25**
Microtext Disc	**£46**
Microtext Rom	**£199**
NLQ DESIGNER	**£25**
Numerator – Archi	**£69**
Numerator – BBC	**£39**
Pendown ROM	**£32**
Rom Manager	**£20**
SERIAL ULA	**£13**
TED	**£35**
Termulator B, B+	**£28**
Termulator Master	**£32**
Video ULA	**£14**
ULTRACALC II	**£26**
1Mb OS ROM	**£39**

Hi-Speed, Low Cost Archi Hard Disc Drive

Watford's advanced interface allows IDE drives to work on any Archimedes machine, speeds in excess of SCSI devices can be obtained at a fraction of the cost of a SCSI drive.

Up to four drives are supported by the IDE filing system IDEFS, up to two drives can be attached to each expansion card, up to four cards can be installed in a machine. An optional 20Mb or 40Mb hard disc can be supplied on the podule expansion card itself, with its fast transfer rate and power saving modes the drive is ideal for storing commonly used software such as the !Fonts application.

A powerful security feature has been provided with the two unique commands *IDELock and *IDEUnlock, ideal for educational establishments where hacking or tempering may be prevalent that may lead to loss of data. Once locked, the configuration can not be changed until a secret password is used. The !IDEForm Write Protect option is particularly useful in conjunction with *IDELock as it will prevent any unauthorised deletion of data.

By an innovative use of on-board memory, the card will remember its configuration, even if moved to another slot or even a different machine, this also includes the unique security features.

Hardware

- Single width EuroCard
- Supports proposed ANSI ATA (IDE) specification
- Fast 16 bit MEMC interface interrupt driven to support background disc operations
- 5 Mbytes per second peak transfer rate
- Built in Non Volatile RAM to hold configuration
- LED activity indicator
- 37 way D type socket for external drives
- Optional on-card 20Mb or 40Mb hard disc
- Up to two drives (master and slave) per card
- Multiple cards per machine (up to four)

Software

- Conforms fully to the Acorn IDE Specification
- All software supplied in ROM
- Filing system 'IDEFS'
- Desktop filer with drive ready detection and disc name under icon
- !IDEForm, WIMP based configuration and formatting software
- Drives can be individually write protected
- Up to four drives over multiple cards
- Power saving standby modes supported with configurable timeout
- Drives can be used without translation in native mode for minimum overhead
- !IDEFSDisk, creates PC emulator hard discs

Prices

Part No.	Capacity	Access Speed	Price
ADA 0520	44Mb	28mS	**£249**
ADA 0530	100Mb	16mS	**£379**
ADA 0570	200Mb	15mS	**£499**
ADA 0580	330Mb	15mS	**£895**

All the above 3.5" hard drives are supplied complete with Controller Card, cable & Software on ROM. (Internal fitting). For use with A300/A400/A500 series machines.

For A3000 users an additional external Case and PSU will be required.

AAA 0300 External Case & PSU for A3000	**£85**

Internal Hard Disc Drives for A3000

State of the art, 4 layer internal IDE Hard Cards for the A3000. Software supplied in, On-board ROM.

ADA 0700	21Mb	23mS	**£185**
ADA 0720	44Mb	19mS	**£385**
ADA 0750	60MB	18MS	**£425**
ADA 0730	89Mb	18mS	**£685**

Supplied ready assembled. No soldering required. Simply plug into the alloted space.

Archi IDE Hard Cards

"Simply plug and play"

Watford's NEW low cost, high performance revolutionary IDE Hard Cards for the A300 and A400 series Archimedes are unbelievably easy to install – you simply slot one into any vacant podule backplane slot in the rear of your computer. These stunningly engineered, light weight but fast, 2.5" miniature hard drives are mounted onto the professionally designed cards, and are supplied with the fully Acorn-conformant IDE Filing System ready installed and ready to run. A novel feature of the hard cards is that they can be easily removed and transported to another Archimedes, for example to make a hard disc backup, or to transfer saved files from work to home etc. Security of files on the hard disc is ensured by our unique security password lock, which allows files to be read only, but not overwritten or deleted – ideal for use in school applications where the integrity of your master software needs to be retained.

ADA 0650	21Mb	23mS	**£199**
ADA 0660	44Mb	28mS	**£375**
ADA 0670	89Mb	18mS	**£675**

(Can be used as a Removable Hard Drive)

NEW Archimedes A300/A400 SCSI Hard Disc Offer

(while stocks last)

100MB Hard Disc Upgrade complete with Controller card, Cables, Formatter and Manuals

RRP: £999

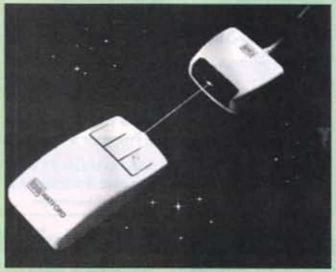
Offer Price: £399

Syquest Removable Disc Units

These Hard Drive units are supplied complete with a cartridge 42Mb removable, cables and a high flow fan for cooling.

• Syquest Drive Unit pack	**£399**
• As above + SCSI Card	**£535**
• Spare 42Mb Disc	**£55**

NEW Archimedes Cordless Mouse



Ever found that using a mouse on a busy desktop has its problems? The cable is always being caught up in papers, tangled round equipment and other cables etc, and what about that cup of coffee spilled over your work!

Watford Electronics' new Cordless Mouse solves these problems by removing the cause for concern - replacing the cable with a simple infra red link. It still provides all the speed and easy control of a conventional mouse, but with complete freedom. In use, there are no operating differences between the standard mouse and the new cordless mouse so all mouse functions and mouse driven RISC software will be fully compatible. Pinpoint accuracy is ensured by a unique Accelerator button, which, when pressed, moves the pointer by just a tiny amount for a large slow movement of the mouse, but by a large amount for a quick wizz of the mouse.

Features

- Infra Red Signal Transmission
- High Resolution 200 DPI
- High Tracking Speed of 600mm/s up
- Anti-static Silicon Rubber Coated Ball
- Low Friction Teflon Footpads
- Power - by two AAA size batteries (not included)
- Automatic Standby Mode after 5 seconds inactive
- Auto Power Shut-Down after 20 seconds inactive

Price £59

Watford Electronics are:

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- Cambridge Computer Dealer
- Citizen Printers Special Dealer
- Computer Concept Premier Dealer
- EIZO Monitor Dealer
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- NEC Appointed Dealer
- Panasonic Premier Dealer
- Roland Plotter Official Dealer
- Star Printer Premier Dealer
- Taxan Appointed Monitor Dealer
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Watford Electronics

Acorn

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Software Bargains and Mercury Games

Established for many years in MAIL ORDER for all Acorn computers!

Great Value

Unused BBC B's

High Specification BBCs for only £176.25!
(Includes, DFS, Econet, a word Processor & Speech ROMs)

Variety of special bundle packs available to include a BBC B & Cumana 5.25" Disc Drive from only £279.95

Please write or 'phone for further information

Printers

Panasonic KX-P1081	9pin dot matrix	£159.95
Panasonic KX-P1170	9pin dot matrix	£169.95
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Seikosha 1900 Plus	9pin dot matrix	£121.95
Seikosha SP2400	9pin dot matrix	£159.95
Seikosha SL92	24pin dot matrix	£249.95

Prices include VAT, cable & delivery!

(Delivery free UK mainland only, excluding Scottish Highlands)
** Full specifcations available on request **

BBC & ELE

Send for our Catalogue!	BBC/ELE	B-Disc	Cpct
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E-Type	6.50	9.75	10.50
Elite	9.95	11.95	15.95
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Fun School 3 (0-5 yrs) (BBC only)	9.95	13.95	-
Fun School 3 (5-7 yrs) (BBC only)	9.95	13.95	-
Fun School 3 (7+ yrs) (BBC only)	9.95	13.95	-
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Micro Power Magic 3 *	-	6.95	-
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Superior Collection 2 (BBC only)	6.95	8.95	10.50
Superior Colection 3 (Ele only)	6.95	-	-
Tank Attack (40t)	9.95	11.95	-
U.I.M. (Needs 16k Sideways RAM)	-	12.95	14.25
White Magic 1 or 2 (each)	6.50	9.75	10.50

(* Please state 40t or 80t disc)

CUT

(MU42)

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☐ Archimedes A3000/A5000 ☐ BBC B/B+/ Master 128/Cpct ☐ Electron

Arch/A3000/A5000

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Those little grey cells

John Allen takes a look at a budget priced spreadsheet

Product: Calc
Price: £25.95
Supplier: Circular Triangles, 13 Woodhall Terrace, Juniper Green, Edinburgh EH4 JBR
Requirements: Risc OS

IT'S good to see a wider range of basic Risc OS applications coming out at affordable prices. Calc, at £25.95, is a spreadsheet well within the home or education user's budget.

It does not have the facilities of high specification packages like PipeDream, Schema or Eureka, but it is easy to use and conforms to the Risc OS conventions.

Calc is supplied on a single disc together with a 42-page manual. It is not protected so can be copied to floppy working disc or hard drive, and that is all that has to be done before it can be loaded and used. A draw file for a function key strip is supplied on the disc.

Click on the Calc icon and two windows open: The sheet and a command window. The sheet is laid out conventionally with letter column headings and numbered rows and has a dark blue background with white lettering and a red cursor.

Fortunately this not entirely subtle choice of colours can easily be altered to something a little more conventional and saved in place of the file Upset in the Calc directory.

As you would expect for a budget spreadsheet there is a limit to the size of sheet it can handle – 100 rows by 52 columns – but this is adequate for most everyday applications. Also it only uses the Risc OS system font – outline ones are not available.

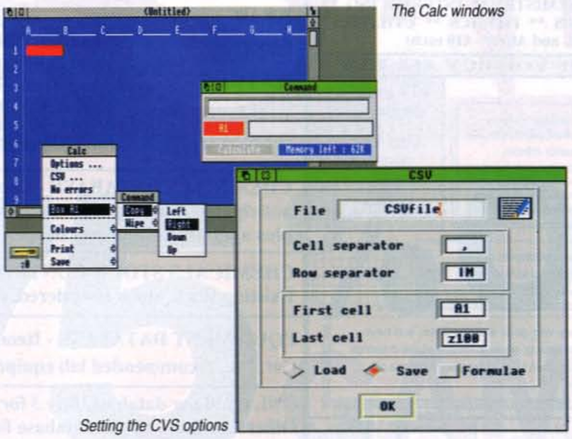
The rows are double spaced which rather restricts the amount of data on the screen at any one time, compared with most other spreadsheets. Column widths can be adjusted with the mouse, and the number of decimal places displayed can be set separately for each column.

Columns are lettered from A to Z and then a to z. Most other software is independent of whether upper or lower case characters are used and so it is easy to accidentally enter lower case column headings into Calc instead of upper case.

The other side to this drawback is that because all of the 52 columns are identified by a single letter it is possible to have a simple dialogue box allowing these to be rearranged at any time.

Although Calc runs in windows from the Desktop, it is only possible to have one sheet in use at a time, although, given enough memory, it is possible to have Calc loaded several times, each with a different sheet.

With one sheet there can be more than one window open on it, with different windows showing different portions of the same sheet. This provides a somewhat messy way of fixing some rows or columns in one window, maybe headings, while scrolling the contents of another with which it is aligned.



File: CSVfile
Cell separator: ,
Row separator: |M
First cell: A1
Last cell: z100

The Calc windows

Setting the CVS options

Commands

Pressing the mouse's menu button within a sheet produces a main menu, but this does not cover most of the facilities which are accessed by entered commands in the command window. If a formula is entered followed by the Return key it will be placed in the cell containing the cursor. Most commands are preceded by the / character and there are some \ commands which act on the whole sheet.

Some commands have control key short cuts or function key equivalents and follow Risc OS conventions with F3 saving a file and Print accessing the Print dialogue box.

There is a limited range of functions available for use in expressions. Besides the normal add, subtract, multiply and divide, it is possible to add up all the values within the cells in a particular area of a sheet and to find the average, minimum, maximum or spread of the values. These just about cover the basic requirements.

As well as loading and saving files in its own format, Calc will also load and save in CSV – Comma Separated Value – form. This is useful for transferring to or from other packages, maybe for mail merging into a document, storing in a database, or as data for a graph plotting package.

The loader assumes that cells are separated by ',' and rows by the carriage return character – Ascii 13 – but these can easily be changed. For example you can have the tab character between cells and line feeds between rows, which is effectively the Ascii format output of PipeDream. Printing is via the normal Risc OS driver appropriate to the printer in use. A strange quirk however is that Calc will not recognise an Acorn version 2 driver if it was loaded after Calc – it must be on the icon bar before Calc is loaded.

As you would expect Calc allows formulae to be replicated, or copied, from one cell to another. This is achieved by the /R command where the formulae in one area are copied into another. If it is a single formula which has to be copied for the rest of the row or column, the replication can also be done from the Box Copy menu or by using Copy and the appropriate cursor key.

The formulae are normally adjusted to take account of the different cell they they are placed in, which is known as relative replication. If the full /R command is used it is also possible to fix the formulae, either completely or partially.

Graphs

The review copy of Calc was version 2.35 and was able to produce simple line and bar graphs which were linked directly to the sheet, so that if a value in the sheet changes the graph will also change. The facilities are not stunning, compared with full graph plotting packages or PipeDream, but will produce the sort of simple graphs that the home or education user may require.

At the time of writing this is not included in the product on sale, if you want these facilities you should check progress before purchase.

The manual is adequate, with a tutorial section going over the main facilities and a reference section detailing them. There does, however, appear to have been quite a lot of features added to Calc since the manual was printed, so it is necessary to consult a Readme file on the disc and be prepared for some experimenting.

Summing up

Calc should not be compared to the top of range Risc OS spreadsheets like PipeDream, Schema or Eureka. If you are a business user you will almost certainly need something of greater complexity. However for the home or education user, Calc's price tag makes it very attractive. If you are purchasing a spreadsheet to a tight budget, this has to be the front runner.

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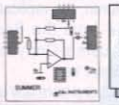

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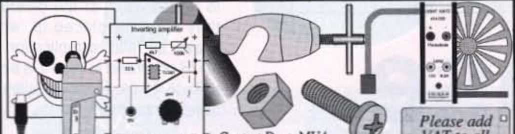

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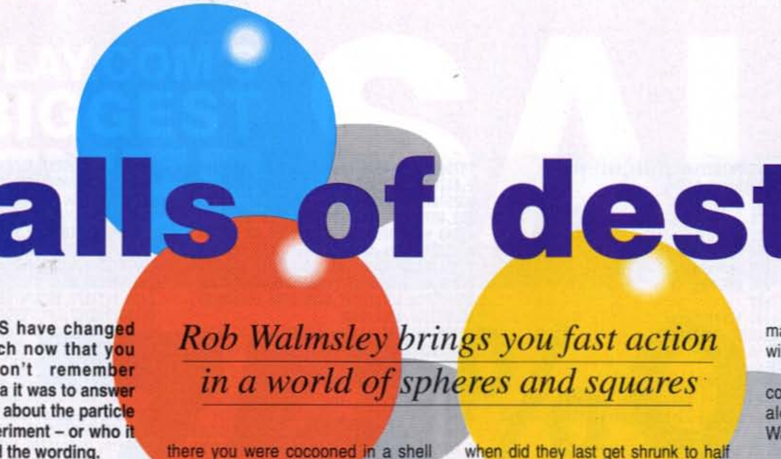

Balls of destiny

Rob Walmsley brings you fast action in a world of spheres and squares

THINGS have changed so much now that you really don't remember whose idea it was to answer the advert about the particle acceleration experiment – or who it was that mis-read the wording.

You thought you were just helping with the experiment *...loads of money, no experience necessary...* but after you'd signed on the dotted line it turned out you *were* the experiment. Little wonder no one else applied. So there you were cocooned in a shell about to be reduced to sub-atomic size and launched along the test track.

And they said eveything would be alright: Just use the Z and X keys to steer and keep your eyes open – when did they last get shrunk to half the size of an electron?

They explained their theories: It'll look like a pathway of squares in one colour, but there will be holes. Some squares will be different colours and will have a variety of effects. They'll make you go faster or slower, some will make you jump and so on.

Well it's alright in theory, but try concentrating when you're zapping along at nearly the speed of light. Watch out for the holes...

Type in the listings, save the first as Destin1 and the second as Destin2, then use the checksums to ensure you've made no typing errors. To run type PAGE=&1900 – if you have a Master or Compact – then just CHAIN"Destin1".

Listing I

```
   10 REM Balls of Destiny 1
   20 REM By Rob Walmsley
   30 REM (c) The Micro User
   40 MODE7:HIMEM=&2F00
   50 VDU23,1,0;0;0;0;
   60 PROCTitle("Balls of Destiny")
   70 PRINTTAB(24,2)"By Rob Walmsley"'
   80 PROCcn("When you asked to take par
t in a")
   90 PROCcn("particle accelerator exper
iment, you")
  100 PROCcn("didn't realise you were th
e particle.")
  110 PROCcn("As you approach the speed
of light,")
  120 PROCcn("the theories say that coll
ision")
  130 PROCcn("with other particles could
 result")
  140 PROCcn("in speed changes, jumping,
 sticking")
  150 PROCcn("inverted controls or even
destruction.")
  160 PROCcn("Can you survive the accele
rator")
  170 PROCcn("and come out alive?")
  180 PRINT'SPC4"Use the keys -"
  190 PRINTSPC14"A - Move left"
  200 PRINTSPC14"S - Move right"
  210 PRINTTAB(7,22)CHR$136"Hit space to
 play the game";
  220 PROCVdus:PROCAss
  230 REPEATUNTILGET=32:PAGE=&1100
  240 CHAIN"Destin2"
  250 DEFPROCTitle(T$)
  260 VDU12,131,157,132,141,10
  270 VDU13,131,157,132,141,30
  280 PROCcn(T$):PROCcn(T$):ENDPROC
  290 DEFPROCcn(T$)
  300 PRINTTAB(20-LENT$/2,VPOS)T$
  310 ENDPROC
  320 DEFPROCAss:base%=&2F00
  330 irq1v=&204:myvec%=&8E
  340 !&70=5000:Table=&A20
  350 FORI%=0TO2STEP2
  360 P%=base%:[OPTI%
  370 LDA &FC:PHA:TXA:PHA:TYA:PHA
  380 LDA &FE4D:AND &FE4E:AND #&20
  390 BNE DLI
  400 LDA &FE4D:AND &FE4E:AND #2
  410 BNE FIS
  420 .Ex PLA:TAY:PLA:TAX:PLA
  430 STA &FC:JMP (myvec%)
  440 .FIS
  450 LDY #0:.LFIS
  460 TYA:ASLA:ASLA:ASLA:ASLA:STA T1
  470 LDA Table,Y:ORA T1:STA &FE21
  480 INY:CPY #12:BNE LFIS
  490 JMP NIC
  500 .DLI LDA #0:STA &FE4D
  510 LDY #0:.LDLI
  520 TYA:ASLA:ASLA:ASLA:ASLA:STA T1
  530 LDA Table+12,Y:ORA T1:STA &FE21
  540 INY:CPY #12:BNE LDLI
  550 .NIC
  560 LDA &FE4B:AND #&DF:STA &FE4B
  570 LDA &70:STA &FE48:LDA &71:STA &FE4
9
  580 LDA #&A0:STA &FE4D:STA &FE4E
  590 JMP Ex
  600 .Start
  610 SEI:LDA irq1v:STA myvec%
  620 LDA irq1v+1:STA myvec%+1
  630 LDA #base%MOD256:STA irq1v
  640 LDA #base%DIV256:STA irq1v+1:CLI:R
TS
  650 .T1 NOP
  660 .M% LDY #23
  670 .Loop LDA Table-4,Y
  680 STA Table,Y:DEY:BNE Loop
  690 LDA &80:STA Table
  700 LDA &81:STA Table+1
  710 LDA &82:STA Table+2
  720 LDA &83:STA Table+3
  730 RTS
  740 ]:NEXT:*FX16
  750 ENDPROC
  760 DEFPROCVdus
  770 ENVELOPE1,10,20,20,16,1,1,1,0,0,0,
-4,127,0
  780 ENVELOPE2,0,0,0,0,0,0,0,121,-1,-1,
-1,120,120
  790 ENVELOPE3,1,-2,-2,-2,255,255,255,3
0,-2,-2,-2,100,5
  800 VDU23,&E0,&00,&01,&07,&1F,&3F,&3F,
&7F,&7F
  810 VDU23,&E1,&00,&80,&E0,&F8,&FC,&FC,
&FE,&FE
  820 VDU23,&E2,&7F,&7F,&3F,&3F,&1F,&07,
&01,&00
  830 VDU23,&E3,&FE,&FE,&FC,&FC,&F8,&E0,
&80,&00
  840 ENDPROC
```

Get it right ✓

```
 10 =    0 0 | 180 = 14D6 B | 350 = E48D F | 520 = 40D2 0 | 690 =  EE8 6
 20 =    0 0 | 190 = 5BB5 5 | 360 =  79F 3 | 530 = D31A 2 | 700 = E624 2
 30 =    0 0 | 200 = AC4E B | 370 = 4E54 E | 540 = BE8A 5 | 710 = 19E2 C
 40 = A6F6 6 | 210 = 7EC3 6 | 380 = 7489 A | 550 = F41B 7 | 720 = 4CA0 F
 50 = 1E64 5 | 220 = 46F9 8 | 390 = E820 2 | 560 = BDCF D | 730 = 9843 E
 60 = D373 F | 230 = A76D 7 | 400 = 114D B | 570 = 6282 5 | 740 = 4E92 A
 70 =  A51 0 | 240 = 1E3D F | 410 =  200 A | 580 = D235 1 | 750 =  7E1 6
 80 = BD7A 7 | 250 = 76B9 0 | 420 = E855 2 | 590 = 225B E | 760 = B09C 5
 90 = 8540 C | 260 = 8178 3 | 430 =  4EC D | 600 =  F7B B | 770 = CA3E A
100 = E21B 2 | 270 = D2A9 B | 440 = E7DB 6 | 610 = 12BE D | 780 = E94C 8
110 = AF96 8 | 280 =  AE1 8 | 450 = 2A69 D | 620 = 5F24 0 | 790 = C780 B
120 = E70B A | 290 = 279C 3 | 460 = BEA6 4 | 630 = A836 E | 800 = D900 8
130 =  CDB D | 300 = FF21 3 | 470 = 1F66 F | 640 = 5C7E 0 | 810 = 6909 6
140 = 44C2 7 | 310 = ED0F 1 | 480 =  257 8 | 650 = 7B37 6 | 820 = F6F5 B
150 = 2EC6 1 | 320 = B7A1 8 | 490 = E1D2 0 | 660 = 7B1E 5 | 830 = CB47 D
160 = 7F1E 1 | 330 = 9011 3 | 500 = 2517 3 | 670 = D1E7 A | 840 =  7E1 7
170 =  A58 1 | 340 = 2939 1 | 510 = 4F5D E | 680 = 4CA3 2 |
```

Listing II

```
   10 REM Balls of Destiny 2
   20 REM by Rob Walmsley
   30 REM (c) The Micro User
   40 *TV 255
   50 MODE2:VDU23,1,0;0;0;0;
   60 HIMEM=&2F00:PROCInit
   70 REPEAT:PROCResetGame
   80 PROCDraw:REPEAT
   90 PROCResetLevel
  100 REPEAT:PROCMove
  110 IFTIME>100 Ti%=Ti%-1:PROCStatus:TI
ME=0:IFTi%=0 Dead%=TRUE
  120 UNTIL Dead% OR Fin%
  130 IFDead% PROCDead ELSESOUND1,1,8,5:
SOUND2,1,8,5:Lev%=Lev%+1:PROCSpeed(250)
  140 IFLev%=5 Sp%=Sp%-2:Lev%=1
  150 IFLev%=4 R%=0:R2%=0
  160 UNTILLives%=0
  170 PROCGameOver
  180 UNTIL0:END
  190
  200 DEFPROCC(V%,X%,Z%)
  210 C%=Distance%-Z%*U2%
  220 VDU25,V%,XC%+D%*X%*U%/C%;YC%+D%*Y2
%/C%;
  230 ENDPROC
  240
  250 DEFPROCBox(X%,Z%)
  260 GCOL0,COL%
  270 PROCC( 4,X%  ,Z%  )
  280 PROCC( 4,X%+1,Z%  )
  290 PROCC(85,X%  ,Z%+1)
  300 PROCC(85,X%+1,Z%+1)
  310 ENDPROC
  320
  330 DEFPROCDraw
  340 PROCMess("Materializing")
  350 FORI%=&A20TO&A20+24:?I%=&7:NEXT
  360 COL%=0
  370 FORZ%=0TO5
  380 FORX%=-2TO1
  390 PROCBox(X%,Z%)
  400 COL%=COL%+1:IFCOL%=12 COL%=0
  410 NEXT,
  420 COLOUR140:COLOUR15
  430 PRINTTAB(0,24);"Level ";TAB(0,25);
"Lives ";TAB(13,24);"Time"
  440 PRINTTAB(2,0);"Balls of Destiny"
  450 PRINTTAB(0,5);SPC(20);
  460 ENDPROC
  470
  480 DEFPROCStatus
  490 COLOUR140:COLOUR15
  500 PRINTTAB(6,24);Lev%;TAB(6,25);Live
s%;TAB(14,25);Ti%;" ";
  510 ENDPROC
  520
  530 DEFPROCMess(Mess$)
  540 TX%=(19-LEN(Mess$))/2
  550 COLOUR14
  560 PRINTTAB(TX%,5);Mess$
  570 ENDPROC
  580
  590 DEFPROCInit
  600 DIM RN%(10)
  610 RESTORE660
  620 FORI%=0TO10
  630 READ RN%(I%)
  640 NEXT
  650
  660 DATA &02020202,&02020207,&02020702
,&02020707,&02070202,&02070207,&02070702
,&07020202,&07020207,&07020702,&07070202
  670 !&70=7200
  680 COLOUR140:CLS:VDU19,12,0;0;0;19,13
,7;0;0;
  690 VDU19,14,8;0;0;19,15,2;0;0;
  700 *FX9 2
  710 *FX10 2
  720 B$=CHR$32+CHR$32+CHR$8+CHR$8+CHR$1
0+CHR$32+CHR$32
```

➤

TAKE IT EASY

If you would like to save the wear and tear on your fingers you'll find this listing – together with all the others from this issue – on this month's disc, sent free if you subscribe to *The Micro User*

```
  730 BA$=CHR$224+CHR$225+CHR$8+CHR$8+CH
R$10+CHR$226+CHR$227
  740 U%=24
  750 U2%=64
  760 D%=2000
  770 Distance%=500
  780 XC%=640
  790 Y2%=-32
  800 YC%=904
  810 DIM Y%(3)
  820 Y%(0)=1:Y%(1)=6:Y%(2)=12:Y%(3)=17
  830 ENDPROC
  840
  850 DEFPROCResetGame
  860 Lives%=3
  870 Lev%=1
  880 Score%=0
  890 YX%=1:DX%=-1:DY%=0
  900 ENDPROC
  910
  920 DEFPROCResetLevel
  930 YY%=18
  940 COLOUR14:COLOUR140
  950 PRINTTAB(2,5);"Entering level ";Le
v%
  960 Ti%=30
  970 Sp%=16
  980 PROCStatus
  990 J%=FALSE:S%=FALSE:INV%=FALSE
 1000 FORI%=&A20TO&A37STEP4:!I%=&0707070
7:NEXT
 1010 En%=FALSE
 1020 Fin%=FALSE
 1030 Dead%=FALSE
 1040 PROCDRY0
 1050 IFLev%=1 RESTORE 2020 ELSEIFLev%=2
 RESTORE2130 ELSEIFLev%=3 RESTORE2210
 1060 FORI%=0TO5
 1070 !&80=&02020202
 1080 CALLM%
 1090 PROCSpeed(Sp%)
 1100 NEXT
 1110 COLOUR140:PRINTTAB(2,5);SPC(16);
 1120 TIME=0
 1130 ENDPROC
 1140
 1150 DEFPROCMove
 1160 IFS%  GOTO1250
 1170 IFLev%=4 PROCRN:GOTO1200
 1180 IFEn% A=&07070707:GOTO1220
 1190 READ A
 1200 IFA=0 En%=TRUE
 1210 IFA=&FF A=&02020202
 1220 !&80=A
 1230 *FX19
 1240 CALLM%
 1250 PROCYou
 1260 PROCSpeed(Sp%)
 1270 ENDPROC
 1280
 1290 DEFPROCRN
 1300 IFEn% A=&07070707:ENDPROC
 1310 R%=R%+1
 1320 IFR%<40 A=RN%(RND(10)-1):ENDPROC
 1330 R%=0
 1340 R2%=R2%+1
 1350 IFR2%<4 A=&03030303 ELSEA=0
 1360 ENDPROC
 1370
 1380 DEFPROCYou
 1390 IFJ% PROCJump:GOTO1420
 1400 IFINKEY-66 DX%=-1:SOUND0,-10,6,1
 1410 IFINKEY-82 DX%=1:SOUND0,-10,6,1
 1420 PROCDRY0
 1430 IFJ%=0 PROCRead:PROCReact
 1440 ENDPROC
 1450
 1460 DEFPROCDRY0
 1470 IFYY%<20 COLOUR136+YX% ELSECOLOUR1
40
 1480 *FX19
 1490 PRINTTAB(Y%(YX%),YY%);B$
 1500 IFINV% YX%=YX%-DX% ELSEYX%=YX%+DX%
 1510 IFYX%=-1 YX%=0 ELSEIFYX%=4 YX%=3
 1520 YY%=YY%+DY%
 1530 COLOUR136+YX%:COLOUR13
 1540 PRINTTAB(Y%(YX%),YY%);BA$
 1550 DX%=0:DY%=0
 1560 ENDPROC
 1570
 1580 DEFPROCSpeed(Sp%)
 1590 Sp%=TIME+Sp%
 1600 REPEATUNTILTIME>Sp%
 1610 ENDPROC
 1620
 1630 DEFPROCRead
 1640 B%=YX%?&A34
 1650 ENDPROC
 1660
 1670 DEFPROCReact
 1680 IFB%=7 Dead%=TRUE:SOUND1,3,50,7
 1690 IFB%=6 J%=TRUE:CO%=4:DY%=-2:SOUND2
,2,2,5
 1700 IFB%=5 S%=TRUE ELSES%=FALSE
 1710 IFB%=4 INV%=NOT INV%
 1720 IFB%=3 Sp%=Sp%/2
 1730 IFB%=1 Sp%=Sp%*2
 1740 IFB%=0 Fin%=TRUE
 1750 ENDPROC
 1760
 1770 DEFPROCJump
 1780 CO%=CO%-1
 1790 IFCO%=0 J%=FALSE:DY%=2
 1800 ENDPROC
 1810
 1820 DEFPROCDead
 1830 IFTi%=0 PROCMess(" Time up!"):PROC
Speed(150):COLOUR140:PRINTTAB(0,5);SPC(2
0);:COLOUR136+YX%:GOTO1870
 1840 DY%=3:PROCDRY0
 1850 PROCSpeed(100)
 1860 COLOUR140
 1870 PRINTTAB(Y%(YX%),YY%);B$
 1880 Dead%=TRUE
 1890 Lives%=Lives%-1
 1900 PROCStatus
 1910 ENDPROC
 1920
 1930 DEFPROCGameOver
 1940 PROCMess("Game Over")
 1950 PROCSpeed(200)
 1960 COLOUR140:PRINTTAB(0,5);SPC(20);
 1970 PROCMess("Hit Spacebar to play")
 1980 REPEATUNTILINKEY-99
 1990 COLOUR140:PRINTTAB(0,5);SPC(20);
 2000 ENDPROC
 2010
 2020 DATA&FF,&FF,&02070702,&02070702,&0
2070702,&FF,&FF,&07020207,&07020207,&070
20207,&FF,&FF,&FF,&FF,&02070702,&0207070
2,&02070702,&02070702,&02070702
 2030 DATA&02070707,&FF,&FF,&FF,&FF,&FF,
&03030303,&FF,&07020702,&07020702,&FF,&0
2070207,&02070207,&FF,&07020702,&0702070
2,&FF,&02070207,&02070207,&FF
 2040 DATA&FF,&01010101,&FF,&FF,&0602020
6,&07070707,&07070707,&07070707,&FF,&FF,
&02070702,&02070202,&02070702,&02020702,
&05070702,&07070202,&FF,&FF
 2050 DATA&02070202,&FF,&07020202,&FF,&0
2020207,&FF,&02020702,&FF,&02030202,&FF,
&07020202,&FF,&02020207,&FF,&02070202,&F
F,&02020702,&FF
 2060 DATA&02060602,&05070705,&07070707,
&02070702,&FF,&FF,&05020505,&02050205,&0
5050202,&02050205,&05070205,&02020205
 2070 DATA&FF,&FF,&FF,&06020202,&0707070
2,&07070702,&07070702,&02070702,&FF,&020
70707,&02070707,&02070707,&FF,&FF,&FF,&0
7070702,&FF,&FF,&FF
 2080 DATA&02070707,&FF,&FF,&07020702,&0
7020702,&02020702,&02070202,&02070207,&0
6070207,&FF,&02020702,&02020702,&0702020
2,&07020202,&FF,&02020207,&02020207
 2090 DATA&FF,&01010202,&02010101,&FF,&0
2070702,&02070702,&02070702,&02020202,&0
7060207,&07070707,&FF,&FF,&FF,&02070702,
&FF,&FF
 2100 DATA0
 2110
 2120 REM Level 2 Data.
 2130 DATA&FF,&FF,&02020702,&02020702,&0
1020706,&02020707,&02020207,&07020207,&0
7020605,&FF,&02070202,&02070202,&0202070
2,&02020702,&FF,&07070207,&07070207,&FF,
&02070702,&02070702,&02070707,&FF,&07070
202,&07070202,&07020202,&07020202
 2140 DATA&02020207,&02020207,&02070707,
&02070707,&FF,&FF,&04040404,&FF,&0202010
2,&01020202,&02010202,&02020201,&0202010
2,&FF,&01020202,&FF,&02070702,&02070702,
&06070706,&07070707,&07070707,&07070707,
&05070702,&02070702
 2150 DATA&FF,&FF,&04020202,&FF,&0202070
7,&02020707,&02020707,&FF,&07070202,&070
70202,&07070202,&07070202,&FF,&FF,&FF,&0
2070702,&02070702,&06070202,&07070202,&0
2070206,&02070207,&06070607,&02070707,&0
2070702,&07070202,&07020202,&02070707
 2160 DATA&FF,&FF,&FF,&02020302,&0702020
2,&07020702,&02020702,&07020702,&0702070
2,&02050605,&02070707,&FF,&07020202,&070
20707,&07020202,&FF,&FF,&07020707,&07020
207,&07070207,&07070207,&07020207,&07020
707
 2170 DATA&07020707,&02020707,&02070707,
&02070707,&02020207,&07020207,&02070702,
&FF,&02070702,&02070702,&07020202,&07070
702,&07070702,&07070202,&07070207,&07070
207,&07060506,&07070707,&07070707,&07070
707,&07020702,&07020702,&07020706
 2180 DATA&07020702,&07020702,&07020702,
&07020602,&07070202,&02020207,&02070707,
&02070207,&02070207,&02070202,&02070602,
&02070702,&02070702,&02020706,&07020207,
&07020207,&02020707,&02070702,&02070702,
&07070702,0
 2190 DATA0
 2200 REM Level 3 Data
 2210 DATA&FF,&FF,&02070202,&02070202,&0
2070202,&02070202,&01070202,&FF,&FF,&FF,
&04040404,&FF,&FF,&02070207,&02070207,&0
2070607,&02020707,&07020207,&07070607,&0
7070207,&02020507,&02070707,&02070207,&0
2070202,&FF,&07020702
 2220 DATA&02070707,&02070606,&02070707,
&02020207,&07070202,&07070702,&07070702,
&FF,&FF,&07020207,&02070202,&02020702,&F
F,&02070207,&07020702,&02070202,&0202020
7,&02020702,&07020202,&FF
 2230 DATA&FF,&02070702,&02070702,&06070
706,&07070707,&07070707,&07070707,&02070
705,&02070702,&02070702,&FF,&FF,&0702020
7,&07020207,&07020707,&07020207,&0707020
7,&07070202,&07070702,&07070702,&0707070
2,&07070202,&02020207,&07020707,&FF,&FF
 2240 DATA&06060606,&07070707,&07070707,
&07070707,&06060606,&07070707,&07070707,
&07070707,&07070207,&07070207,&07020202,
&07020702,&07020702,&02020702,&02070702,
&02070202,&02070207,&FF,&02020702,&05060
702,&07070202,&07020207,&02020707,&02070
707
 2250 DATA&02070707,&FF,&07020707,&FF,&F
F,&07070207,&02020206,&FF,&04020707,&020
20707,&01070703,&02020706,&02020707,&070
20202,&07020202,&FF,&FF,&02010202,&02020
201,&02020102,&01020202,&02010202,&02020
201,&01020102,&FF,&02010202
 2260 DATA&02020702,&07020702,&07020702,
&07020706,&02020707,&02070707,&02070707,
&02070702,&02070202,&02070206,&02070207,
&02070207,&02070207,&02070207,&02070202,
&02070202,&02070602,&02070702,&02070702,
&02070706,&02070202,&07070207,&07070207,
&07070207
 2270 DATA0
```

Get it right

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 =  552 2
  50 = 8029 8
  60 =  87C F
  70 = 3156 3
  80 = 5DD5 C
  90 = 9814 8
 100 = FAD8 1
 110 = 3431 A
 120 =  79B F
 130 = 102D D
 140 = E4EE B
 150 = 4D2C 1
 160 = 3618 9
 170 = B9BD 9
 180 = 741E 1
 190 = D1AD 7
 200 = 7738 F
 210 = F45A A
 220 = BA16 F
 230 = ED0F 1
 240 = D1AD 0
 250 = A341 2
 260 = ED6F E
 270 = 8427 D
 280 = DD92 1
 290 = 5A0F 3
 300 =  3BA A
 310 = ED0F A
 320 = D1AD 8
 330 = B54C B
 340 = 23CA C
 350 = F76F 0
 360 = D963 A
 370 = 3C8C F
 380 = 8E30 E
 390 = F6F9 3
 400 = CDC3 6
 410 = 8300 3
 420 = 58BE 1
 430 = FD20 2
 440 = 45EE 0
 450 = 1D2C F
 460 = ED0F 4
 470 = D1AD 6
 480 = 97F8 9
 490 = 58BE 8
 500 = 7B34 A
 510 = ED0F 1
 520 = D1AD 1
 530 = 4664 C
 540 = 824F 6
 550 = 53D0 0
 560 = 1FD0 E
 570 = ED0F 0
 580 = D1AD 8
 590 =  302 6
 600 = 4C62 E
 610 = 1F11 2
 620 = 6EB1 2
 630 = 9271 D
 640 = 428C 6
 650 = D1AD 2
 660 = 8314 9
 670 = 106A C
 680 = 1F25 8
 690 = C8A2 4
 700 = D4DC 6
 710 = E259 A
 720 = C3D2 D
 730 = 2BD8 7
 740 = 2FBA 8
 750 = AEE3 3
 760 = 7055 5
 770 = 11AD C
 780 = 6B41 3
 790 = D95B F
 800 = 7351 7
 810 = BA41 9
 820 = F608 4
 830 = ED0F F
 840 = D1AD B
 850 = 5F5E 6
 860 = 4C21 D
 870 =  619 5
 880 = 66AC 5
 890 => BD1B A
 900 = ED0F B
 910 = D1AD 2
 920 = CDAC 8
 930 =  838 4
 940 = 9566 3
 950 = 7725 B
 960 = ADFF D
 970 = CF3C 9
 980 = F779 5
 990 = B931 4
1000 = 8A82 0
1010 = 52C1 2
1020 = 36AF F
1030 = BBEB 5
1040 = E21A 8
1050 = A5F7 D
1060 = E8E8 1
1070 = AD9D D
1080 = D863 2
1090 = 483F 3
1100 = 2C83 D
1110 = 3C7C 8
1120 = 173E A
1130 = ED0F 3
1140 = D1AD 6
1150 = EF9E 9
1160 = 24D4 2
1170 = BC2C E
1180 = BA70 4
1190 = E401 A
1200 = 9AA4 E
1210 = 350E 8
1220 = F23A C
1230 = 61AE 6
1240 = D863 A
1250 = 875C 4
1260 = 483F 6
1270 = ED0F 7
1280 = D1AD 9
1290 = 5EB2 8
1300 = 14BA 3
1310 = 8C17 7
1320 = 972C C
1330 = 7CB9 0
1340 = 74CC 5
1350 = 7577 F
1360 =  7E1 0
1370 = D1AD 0
1380 = 91C4 2
1390 = 5811 4
1400 = E790 2
1410 = 4ADC 2
1420 = E21A D
1430 = 5741 D
1440 = ED0F 4
1450 = D1AD 5
1460 =  8ED A
1470 = 1AF6 F
1480 = 61AE 5
1490 = AAB1 0
1500 = DFDF 7
1510 = E8D5 F
1520 = 9237 8
1530 = F82A 2
1540 = 3599 B
1550 = BF50 0
1560 = ED0F 0
1570 = D1AD 1
1580 = 1D87 3
1590 = 397B A
1600 = F0A8 1
1610 = ED0F 3
1620 = D1AD 1
1630 = 6DD3 8
1640 = 5D38 9
1650 = ED0F 9
1660 = D1AD 7
1670 = C98F 3
1680 = 6BCD 2
1690 = 27F4 9
1700 = 9BAF D
1710 = CE19 8
1720 = EA91 0
1730 = B5D7 7
1740 =  9DE F
1750 = ED0F F
1760 = D1AD 1
1770 = A70C 3
1780 = 5527 3
1790 = CB4B 7
1800 = ED0F D
1810 = D1AD F
1820 = 51ED 2
1830 =  B43 2
1840 = DC03 C
1850 = 1DAE E
1860 = 8CC5 D
1870 = AAB1 4
1880 =  890 7
1890 = 1E96 6
1900 = F779 6
1910 = ED0F 1
1920 = D1AD 8
1930 = 333E A
1940 = B145 4
1950 = 8672 9
1960 = B5B3 F
1970 = F297 8
1980 = DD9E 3
1990 = B5B3 1
2000 = ED0F 0
2010 = D1AD 0
2020 = AF47 1
2030 = 8117 5
2040 = 4CFC 6
2050 = 21EF B
2060 = 4118 D
2070 = D1B3 7
2080 = CC31 1
2090 = E410 D
2100 = 6619 9
2110 = D1AD 0
2120 =    0 0
2130 = 931F 8
2140 = 3706 6
2150 = CD45 E
2160 = 8B41 B
2170 = B81B 3
2180 = F611 4
2190 = 6619 0
2200 =    0 0
2210 = 743B 0
2220 = 63EE 6
2230 = 9AC7 0
2240 = E3C1 7
2250 = 83E4 F
2260 = 43F1 5
2270 = 6619 6
```

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LET'S
COMPUTE!

Rom and Ram

LAST time we managed to place a multicoloured sprite on the screen using indirection operators ! and ? Naturally, Rom wasn't satisfied with that and has been going on about moving sprites. Ram has been getting to grips with his new Archimedes but has condescended to continue Rom's instruction.

This month's goodies include a sprite definer for making your own 8 x 16 pixel characters, a short program to move a sprite around and examples of what procedures are and how they work. So *hands off socks – on with PROCs*, or something like that.

One excellent feature of BBC Basic is how easy programs written in it can be structured and therefore more easily understood. Procedures have names and you can access one from any part of a program simply by using PROCname where *name* is the title of your procedure.

Look at Listing I: Line 60 says PROCmessage so BBC Basic looks for a procedure DEFined as PROCmessage – at line 110 – and executes the instructions within the procedure until it reaches the ENDPROC at line 130.

Every procedure must start with a DEFPROCname and end with an ENDPROC. The example here prints a simple message so as not to confuse Rom. You can see that after Basic encounters ENDPROC at line 130 it returns to the next instruction after the place where the procedure was called and continues from there.

Procedures can also pass variables to and from the main program. These are called the procedure's *parameters* and Listing II shows a simple example. Line 60 shows how the word *Hello* can be transferred to the variable *word$* at line 100 and how the number 123456 is transferred to the variable *phone%*.

There must be the same number of parameters at the *calling* end as at the *receiving* end or you'll get the error *Arguments at line xxx*. The instruction:

```
PROCwrite(A$)
```

wouldn't work because there are too few parameters. Neither would:

```
PROCwrite("A.Smith",600,"too-much")
```

Variables inside a procedure like *b* in Listing III are known as LOCAL variables,which means their value only exists in the procedure they are in. So-called *global* variables apply to the whole program.

Run Listing III and you'll see that a value of 8 in the variable *B* is passed to the variable *b* but that *b* only equals 8 in the procedure. Back in the main program *b* equals zero. Sometimes you might want to use variable names in procedures that have already been used.

Listing IV shows how using the command LOCAL in the PROCprint at line 180 preserves the values of *A* and *B*. Run the program as it is then take out line 180 and run it again to see the effect more clearly.

Now we get to the interesting bit. Listing V allows you to create, edit, save and load 8 x 16 pixel sprites and use them in a little moving routine in Listing VI. So before we move our sprite, obviously we'll have to create one so get those digits digitising.

Type in Listing V and after you've spent ages wondering why it won't work, check the small print and say: *Oh, fancy typing in an O for a 0* and try again. Now that it's working (having loaded it from this month's disc – no marks for effort there) here's what to do.

Using the keys indicated in the panel, move the flashing cursor around the blue grid and press any number key between 0 and 7 to place a pixel of that colour where you want it. Use key 0 (black) to erase any mistakes. As you draw your sprite another actual size one is drawn in the little red box and that's what you're going to get to use in your programs.

Pressing F swaps between ordinary colours (0 to 7) and flashing colours (8 to 15). When you are happy with your design you can save it to tape or disc. The extremely user-friendly word SAVE will appear under the blue box and you can type in a suitable name for your sprite, for example *Sprite1* – how's that for imagination, Ram?

Having done that and regretted putting those silly-looking antennae on your sprite you can LOAD it back in, edit it and save it again without the deely boppers – Rom showing his age here and singular lack of taste.

The program contains many instances of procedures and parameter passing but I suppose by this time Rom you're more interested in moving your wondrous creation around than an in-depth appraisal of Ram's programming ability? I thought so.

Okee Dokee! Type in Listing IV but before you run it you need to alter line 20 to the name of your sprite. Done that? Good. Off you go then and use keys:

Z	Left
X	RIGHT
*	UP
?	DOWN

to move your creation around.

Well it may not be the smoothest animation you've seen or the quickest but that's about as good as it can get from Basic. Rom's happy though – he didn't realise you could do things like that. Ram's pleased too because if Rom can understand this then, when it comes to doing the same thing in machine code – Eek! the dreaded M-word – a good understanding of the rudiments will pay dividends.

Let's take a closer look at the listing in order to thoroughly confuse Rom. We'll ignore lines 20 and 40 for now and look at them in a minute – see Duck's Dungeon for details. Line 60 calls the PROCinit which seems like a good name when it comes to initialising variables.

Lines 120 to 190 form the procedure itself while lines 130 and 140 are the variables that contain *offsets* to the sprite movement, that is, how much is added or subtracted to the sprite's original screen address in order to reprint it in its new location. *M%* is the left and right displacement and *N%* the up and down.

Notice that the minimum left and right offset is 8 – try 4 to see what happens. *N%* is 640 which will move a sprite one full character height up or down. Believe me when I say moving sprites up and down in single pixels is not worth losing weeks of sleep over.

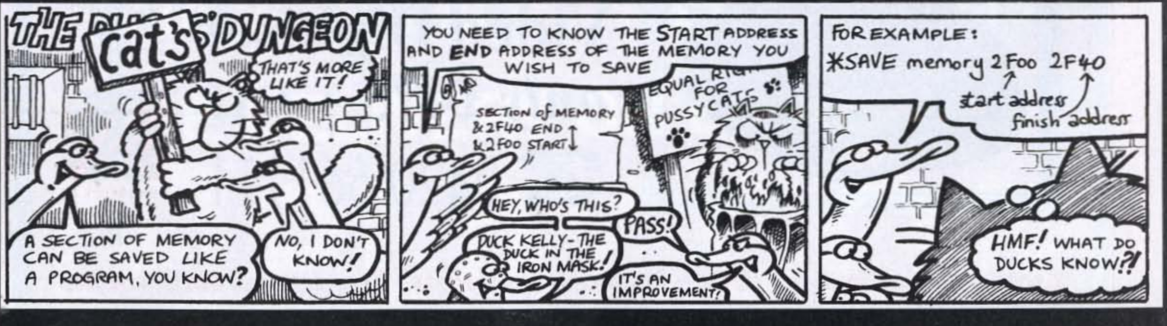
At line 150 *S%* equals the start address of your sprite in memory and line 170 X%=&4000 equals the SCREEN address where the sprite is POKEd to. Then line 180 calls the PROCdraw with the two parameters *X%* and *S%*. These values are passed to the LOCAL variables *x%* and *w%* respectively at line 500.

Lines 510 to 560 grab the relevant numbers from memory and poke them to the correct screen locations, as described last month. Anyway, back to the main part of the program which is the loop lines 70 to 90. Between the REPEAT/UNTIL the PROCkeys, lines 220 to 280, is called.

If any of the relevant keys are pressed, one of the two move procedures is called. There's a separate procedure for left/right and up/down because we only need to wipe out part of the old image before we print the new one. If we wipe out only part it's a lot quicker but where we wipe is

Editing keys for Designer

Arrow Keys	Move Cursor
0 - 7	Colours 0 to 7
F	Toggles flashing colours on/off
S	Save sprite
L	Load Sprite


THE CAT'S DUNGEON
cat's
THAT'S MORE LIKE IT!
A SECTION OF MEMORY CAN BE SAVED LIKE A PROGRAM, YOU KNOW?
NO, I DON'T KNOW!
YOU NEED TO KNOW THE START ADDRESS AND END ADDRESS OF THE MEMORY YOU WISH TO SAVE
SECTION of MEMORY &2F40 END &2F00 START
EQUAL RIGHTS FOR PUSSYCATS
HEY, WHO'S THIS?
PASS!
DUCK KELLY - THE DUCK IN THE IRON MASK!
IT'S AN IMPROVEMENT?
FOR EXAMPLE:
*SAVE memory 2F00 2F40
start address
finish address
HMF! WHAT DO DUCKS KNOW?!

Moving pictures

Mike Goldberg goes away and comes back without changing anything

```
   10 REM PROC1
   20 MODE6
   30 CLS
   40 PRINT''''
   50
   60 PROCmessage
   70
   80 PRINT"And now we're back at line 7
0"
   90 END
  100
  110 DEFPROCmessage
  120 PRINT"Hi,we're in a procedure!"
  130 ENDPROC
```

```
 10 =    0 0
 20 = 9ADD D
 30 = 7A16 5
 40 = 3BC6 E
 50 = D1AD F
 60 = AF3A 6
 70 = D1AD 9
 80 = 8F98 3
 90 = FD2E 3
100 = D1AD B
110 = 429C 0
120 = 1C20 D
130 = EDOF 0
```

```
   10 REM PROC2
   20 MODE6
   30 CLS
   40 PRINT''''
   50
   60 PROCwrite("Hello",123456)
   70
   80 END
   90
  100 DEFPROCwrite(word$,phone%)
  110 PRINTword$;" My phone number is ";
phone%
  120 ENDPROC
```

```
 10 =    0 0
 20 = 9ADD D
 30 = 7A16 5
 40 = 3BC6 E
 50 = D1AD F
 60 = C6BE 5
 70 = D1AD 2
 80 = FD2E 8
 90 = D1AD 1
100 = FC63 3
110 = 9E68 D
120 = EDOF 4
```

```
 10 REM PROC3
 20 MODE6
 30 CLS
 40 PRINT''''
 50 B=8
 60 PRINT"Out of procedure B = ";B
 70
 80 PROCprint(B)
 90 PRINT"But back out of"
100 PRINT"   the procedure b = ";b
110 END
120
130 DEFPROCprint(b)
140 PRINT"In the procedure b = ";b
150 ENDPROC
```

```
 10 =    0 0
 20 = 9ADD D
 30 = 7A16 5
 40 = 3BC6 E
 50 = B75F 2
 60 = 913F 7
 70 = D1AD 4
 80 = 3E08 9
 90 = 2611 F
100 = B0BC 7
110 = FD2E 8
120 = D1AD E
130 = B26D B
140 = 29B5 3
150 = EDOF 0
```

```
 10 REM PROC4
 20 MODE6
 30 CLS
 40 PRINT''''
 50 A=6:B=9
 60 PRINT" OUT"
 70 PRINT"A = ";A
 80 PRINT"B = ";B
 90 PRINT
100
110 PROCprint
120 PRINT" OUT"
130 PRINT"A = ";A
140 PRINT"B = ";B
150 END
160
170 DEFPROCprint
180 LOCALA,B
190 A=2:B=1
200 PRINT" IN"
210 PRINT"A = ";A
220 PRINT"B = ";B
230 PRINT
240 ENDPROC
```

```
 10 =    0 0
 20 = 9ADD D
 30 = 7A16 5
 40 = 3BC6 E
 50 = 2615 D
 60 = E812 F
 70 = 28F7 0
 80 = C016 F
 90 = FF3E F
100 = D1AD 2
110 = BBAB F
120 = E812 A
130 = 28F7 2
140 = C016 A
150 = FD2E E
160 = D1AD 6
170 = 10CF C
180 = EDD1 C
190 = 2E1B 5
200 =  6BA 0
210 = 28F7 7
220 = C016 2
230 = FF3E 2
240 = EDOF 3
```

different in moving left/right or up/down.

DEFPROCmoveLR(x%,W%) between lines 310 and 380 wipes out the lefthand or righthand column of a sprite whereas DEFPROCmoveUD(x%,W%) between lines 410 and 470 wipes out a whole character either the top one if moving down or the bottom one if moving up.

I chose MODE2 to display all the colours but MODE5 with only four colours would have performed better in the *speed of animation department.* This is because in MODE2 two pixels are stored per memory location whereas in MODE5 four pixels are stored. So there would be less memory to be accessed each time a sprite was plotted and therefore much quicker. Talking of memory take a look at line 20 again in Listing VI. Note that the sprite is *LOADed to the start address &2F00.

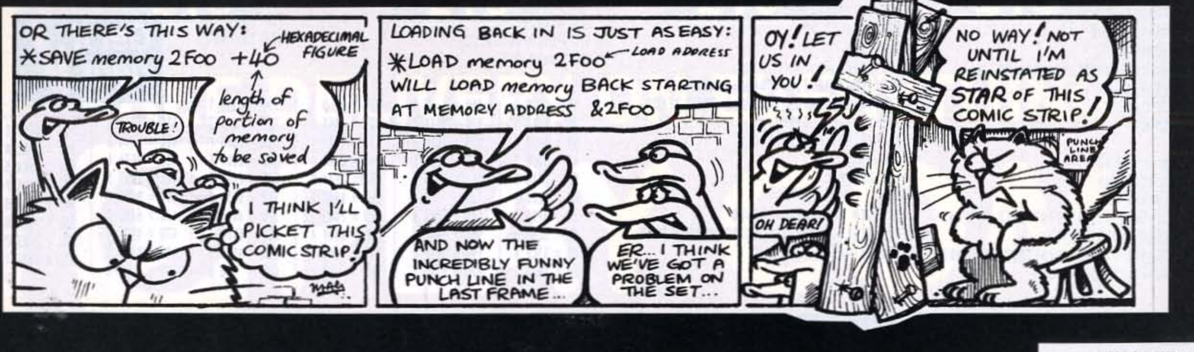
This stores the sprite above the TOP of the program but under the start of MODE2 screen addresses – see the figure. Line 40 ensures that nothing after &2F00 gets overwritten but as that would take all day to explain I think we'll leave it for now.

● Now if anyone out there knows how to get past the Triceratops in Chuck Rock please please tell me before I get impaled once more. Unga-Bogga.

WHERE DID I PUT THAT ROMBURGER?
SO MUCH FOR HIS MEMORY

```
 10 REM DEFINER
 20 MODE2
 30 HIMEM=&2F00
 40 VDU23;8202;0;0;0;
 50 PROCgrid
 60 PROCinit
 70 REPEAT
 80 PROCkeys
 90 UNTIL0
100 END
```

➤


OR THERE'S THIS WAY:
*SAVE memory 2F00 +40
HEXADECIMAL FIGURE
length of portion of memory to be saved
TROUBLE!
I THINK I'LL PICKET THIS COMIC STRIP!
LOADING BACK IN IS JUST AS EASY:
*LOAD memory 2F00
LOAD ADDRESS
WILL LOAD memory BACK STARTING AT MEMORY ADDRESS &2F00
AND NOW THE INCREDIBLY FUNNY PUNCH LINE IN THE LAST FRAME...
ER... I THINK WE'VE GOT A PROBLEM ON THE SET...
OY! LET US IN YOU!
OH DEAR!
NO WAY! NOT UNTIL I'M REINSTATED AS STAR OF THIS COMIC STRIP!
PUNCH LINE AREA

Rom and Ram

```
  110 REM === INIT
  120 DEFPROCinit
  130 VDU23,224,0,112,112,112,112,112,11
2,112
  140 B$=CHR$224
  150 X%=320
  160 Y%=864
  170 A%=704
  180 B%=860
  190 C%=12
  200 F%=1:PROCflash
  210 VDU4:COLOUR3:PRINTTAB(13,5)"Actual
"TAB(14,6)"size"
  220 VDU5
  230 GOSUB1440
  240 ENDPROC
  250
  260 REM === GRID
  270 DEFPROCgrid
  280 GCOL0,4
  290 FORI%=352TO864STEP32
  300 MOVE320,I%
  310 PLOT1,256,0
  320 NEXT
  330 FORI%=320TO576STEP32
  340 MOVEI%,352
  350 PLOT1,0,512
  360 NEXT
  370 GCOL0,1
  380 MOVE690,872
  390 PLOT1,88,0
  400 PLOT1,0,-84
  410 PLOT1,-88,0
  420 PLOT1,0,84
  430 ENDPROC
  440
  450 REM === KEYS
  460 DEFPROCkeys
  470 IFINKEY-26PROCmove(-32,0,-8,0)
  480 IFINKEY-122PROCmove(32,0,8,0)
  490 IFINKEY-58PROCmove(0,32,0,4)
  500 IFINKEY-42PROCmove(0,-32,0,-4)
  510 IFINKEY-82PROCikon("S")
  520 IFINKEY-87PROCikon("L")
  530 c%=INKEY(0)-48
  540 IFc%>-1ANDc%<8PROCdraw(c%)
  550 IFc%=22PROCflash
  560 ENDPROC
  570
  580 REM === MOVE
  590 DEFPROCmove(x%,y%,a%,b%)
  600 IFX%+x%<320ORX%+x%>544ENDPROC
  610 IFY%+y%<384ORY%+y%>864ENDPROC
  620 GOSUB1440
  630 X%=X%+x%:Y%=Y%+y%
  640 A%=A%+a%:B%=B%+b%
  650 GOSUB1440
  660 ENDPROC
  670
  680 REM === DRAW
  690 DEFPROCdraw(c%)
  700 IFF%=1c%=c%+8
  710 GOSUB1440
  720 GCOL0,c%:MOVEX%,Y%:PRINTB$
  730 PLOT69,A%,B%
  740 GOSUB1440
  750 ENDPROC
  760
  770 REM === FLASH
  780 DEFPROCflash
  790 COLOUR5
  800 IFF%=0F%=1:VDU4:PRINTTAB(2,1)"FLAS
HING COLOURS":VDU5:ENDPROC
  810 IFF%=1F%=0:VDU4:PRINTTAB(2,1)"ORDI
NARY COLOURS":VDU5:ENDPROC
```

TAKE IT EASY

If you would like to save the wear and tear on your fingers you'll find this listing – together with all the others from this issue – on this month's disc, sent free if you subscribe to *The Micro User*

```
 820 ENDPROC
 830
 840 REM === LOAD/SAVE
 850 DEFPROCikon(W$)
 860 *FX21
 870 GOSUB1440
 880 IFW$="L"PROCload
 890 screen%=&3DE0
 900 mem%=&2F00
 910 FORJ%=0TO1
 920 FORI%=0TO31
 930 IFW$="L"screen%?I%=mem%?I%
 940 IFW$="S"mem%?I%=screen%?I%
 950 NEXT
 960 mem%=mem%+32
 970 screen%=screen%+640
 980 NEXT
 990 IFW$="S"PROCsave
1000 IFW$="L"PROCdrawload
1010 VDU7
1020 GOSUB1440
1030 ENDPROC
1040
1050 REM === LOAD
1060 DEFPROCload
1070 LOCALX%,Y%
1080 VDU4
1090 *FX21,0
1100 INPUTTAB(2,22)"LOAD "name$
1110 $&700="LOAD "+name$+" 2F00"
1120 Y%=7:CALL&FFF7
1130 PRINTTAB(2,22)SPC17
1140 VDU5
1150 ENDPROC
1160
1170 REM === DRAW-LOAD
1180 DEFPROCdrawload
1190 VDU5:LOCALX%,Y%
1200 X%=320:Y%=864
1210 FORJ%=860TO800STEP-4
1220 FORI%=704TO760STEP8
1230 K%=POINT(I%,J%):GCOL0,K%
1240 MOVEX%,Y%:PRINTB$
1250 X%=X%+32
1260 NEXT
1270 X%=320:Y%=Y%-32
1280 NEXT
1290 ENDPROC
1300
1310 REM === SAVE
1320 DEFPROCsave
1330 LOCALX%,Y%
1340 VDU4
1350 *FX21,0
1360 INPUTTAB(2,22)"SAVE "name$
1370 $&700="SAVE "+name$+" 2F00 2F40"
1380 Y%=7:CALL&FFF7
1390 PRINTTAB(2,22)SPC17
1400 VDU5
1410 ENDPROC
1420
1430 REM === CURSOR GOSUB
1440 GCOL3,C%:MOVEX%,Y%:PRINTB$:PLOT69,
A%,B%:RETURN
```

```
 10 =    0 0 | 250 = D1AD 3 | 490 = 135B E | 730 = 4228 A |  970 = 8F61 8 | 1210 = FB27 5
 20 = DA59 9 | 260 =    0 3 | 500 = A08C 3 | 740 = 4137 5 |  980 = 2C83 E | 1220 = 23A1 3
 30 = 6058 E | 270 = B225 6 | 510 = 4169 B | 750 = ED0F 3 |  990 = FF1E E | 1230 = BEDE 6
 40 = F716 9 | 280 = 538A 8 | 520 = A735 0 | 760 = D1AD 5 | 1000 = FF05 A | 1240 = EE33 F
 50 = 58D2 F | 290 = 2A2A 4 | 530 = 147A D | 770 =    0 5 | 1010 = 4638 5 | 1250 =  FD4 3
 60 = DEBB 7 | 300 = FF54 4 | 540 = E695 8 | 780 = 6FDE 5 | 1020 = 4137 8 | 1260 = 2C83 A
 70 = BFBA 9 | 310 = 4896 C | 550 = E2BD 1 | 790 = A9CD 3 | 1030 = ED0F 9 | 1270 = CDE9 1
 80 = B0B6 7 | 320 = 2C83 9 | 560 = ED0F C | 800 = 6EA0 A | 1040 = D1AD 6 | 1280 = 2C83 8
 90 = 53CE 6 | 330 = 1D5D B | 570 = D1AD 3 | 810 = DDA6 5 | 1050 =    0 6 | 1290 = ED0F 8
100 = FD2E 3 | 340 = 4B61 2 | 580 =    0 3 | 820 = ED0F 3 | 1060 = 24A1 D | 1300 = D1AD 7
110 =    0 3 | 350 = E8F8 1 | 590 = 603A 2 | 830 = D1AD 3 | 1070 = A269 B | 1310 =    0 7
120 = 344C 2 | 360 = 2C83 D | 600 = 547A 9 | 840 =    0 3 | 1080 = 765B 2 | 1320 = 7A2C 6
130 = F6D9 F | 370 =  32F 0 | 610 = 7DA1 3 | 850 = 2EDC 3 | 1090 = 2B9A D | 1330 = A269 2
140 = D580 2 | 380 = 6CCD 6 | 620 = 4137 C | 860 = B5F5 1 | 1100 = 1777 E | 1340 = 765B C
150 = 8A0B 6 | 390 = 76DD 5 | 630 = CE0C B | 870 = 4137 D | 1110 = C876 4 | 1350 = 2B9A 6
160 = B31A 2 | 400 = D864 4 | 640 = E2CF E | 880 = 1C01 9 | 1120 = FAD6 3 | 1360 = 550B 9
170 = 224B 7 | 410 =  BB2 D | 650 = 4137 0 | 890 = 174D 4 | 1130 =  C7E 7 | 1370 = 7407 0
180 = 2AB8 D | 420 = E38E 9 | 660 = ED0F 2 | 900 = 79FC 4 | 1140 = 667A D | 1380 = FAD6 8
190 = D3F0 C | 430 = ED0F E | 670 = D1AD 8 | 910 = 668C A | 1150 = ED0F A | 1390 =  C7E C
200 = 8B1B 0 | 440 = D1AD 2 | 680 =    0 8 | 920 = 18F2 C | 1160 = D1AD 9 | 1400 = 667A D
210 = 4C3C 7 | 450 =    0 2 | 690 = 62DE 7 | 930 = AFCF 3 | 1170 =    0 9 | 1410 = ED0F F
220 = 667A 6 | 460 = 5A41 1 | 700 =  612 5 | 940 = 3949 D | 1180 = EBB3 1 | 1420 = D1AD E
230 = 4137 2 | 470 = 480C 0 | 710 = 4137 F | 950 = 2C83 D | 1190 = D90B D | 1430 =    0 E
240 = ED0F 8 | 480 = E392 7 | 720 = 913C 3 | 960 =  4A8 8 | 1200 = 82CC 6 | 1440 = 9417 0
```

```
 10 REM === MOVER
 20 *LOAD IKON 2F00
 30 MODE2
 40 HIMEM=&2F00
 50 VDU23;8202;0;0;0;
 60 PROCinit
 70 REPEAT
 80 PROCkeys
 90 UNTIL0
100 END
110 REM === INIT
120 DEFPROCinit
130 M%=8
140 N%=640
150 S%=&2F00
160 REM Screen position
170 X%=&4000
180 PROCdraw(X%,S%)
190 ENDPROC
200
210 REM === KEYS
220 DEFPROCkeys
230 IFINKEY-98PROCmoveLR(-M%,X%+24)
240 IFINKEY-67PROCmoveLR(M%,X%)
250 IFINKEY-73PROCmoveUD(-N%,X%+640)
260 IFINKEY-105PROCmoveUD(N%,X%)
270 TIME=0:REPEATUNTILTIME>2
280 ENDPROC
290
300 REM === MOVE LEFT/RIGHT
310 DEFPROCmoveLR(x%,W%)
320 FORI%=0TO4STEP4
330 I%!W%=0
340 I%!(W%+640)=0
350 NEXT
360 X%=X%+x%
370 PROCdraw(X%,S%)
380 ENDPROC
390
```

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```
400 REM === MOVE UP/DOWN
410 DEFPROCmoveUD(x%,W%)
420 FORI%=0TO28STEP4
430 I%!W%=0
440 NEXT
450 X%=X%+x%
460 PROCdraw(X%,S%)
470 ENDPROC
480
490 REM === DRAW
500 DEFPROCdraw(x%,w%)
510 FORJ%=0TO1
520 FORI%=0TO28STEP4
530 x%!I%=w%!I%
540 NEXT
550 x%=x%+640:w%=w%+32
560 NEXT
570 ENDPROC
```

Get it right ✓

```
 10 =    0 0 | 110 =    0 1 | 210 =    0 5 | 310 = 7398 5 |               |
 20 = F6E3 3 | 120 = 344C C | 220 = 5A41 6 | 320 = 36EB 2 | 410 = 5FC5 0 |
 30 = DA59 3 | 130 = FEBE B | 230 = 402E 1 | 330 = 2E76 F | 420 = 4944 E | 500 = B780 C
 40 = 6058 3 | 140 = 5C38 E | 240 = EC56 1 | 340 = 88BF E | 430 = 2E76 4 | 510 = 668C A
 50 = F716 9 | 150 = EDF4 F | 250 = 2E14 B | 350 = 2C83 2 | 440 = 2C83 5 | 520 = 4944 5
 60 = DEBB 2 | 160 =    0 F | 260 = D950 E | 360 = BC34 C | 450 = BC34 7 | 530 = F4C5 F
 70 = BFBA 3 | 170 = 766A B | 270 = 7D45 3 | 370 = 6ADE 6 | 460 = 6ADE C | 540 = 2C83 0
 80 = B0B6 4 | 180 = 6ADE 9 | 280 = ED0F A | 380 = ED0F 4 | 470 = ED0F 0 | 550 = 9867 B
 90 = 53CE 9 | 190 = ED0F C | 290 = D1AD A | 390 = D1AD B | 480 = D1AD 3 | 560 = 2C83 2
100 = FD2E 1 | 200 = D1AD 5 | 300 =    0 A | 400 =    0 B | 490 =    0 3 | 570 = ED0F 1
```

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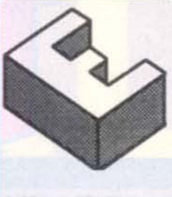

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control by
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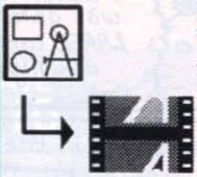

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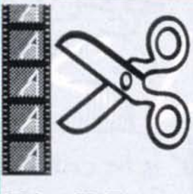

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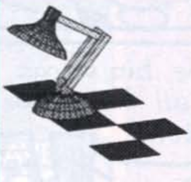

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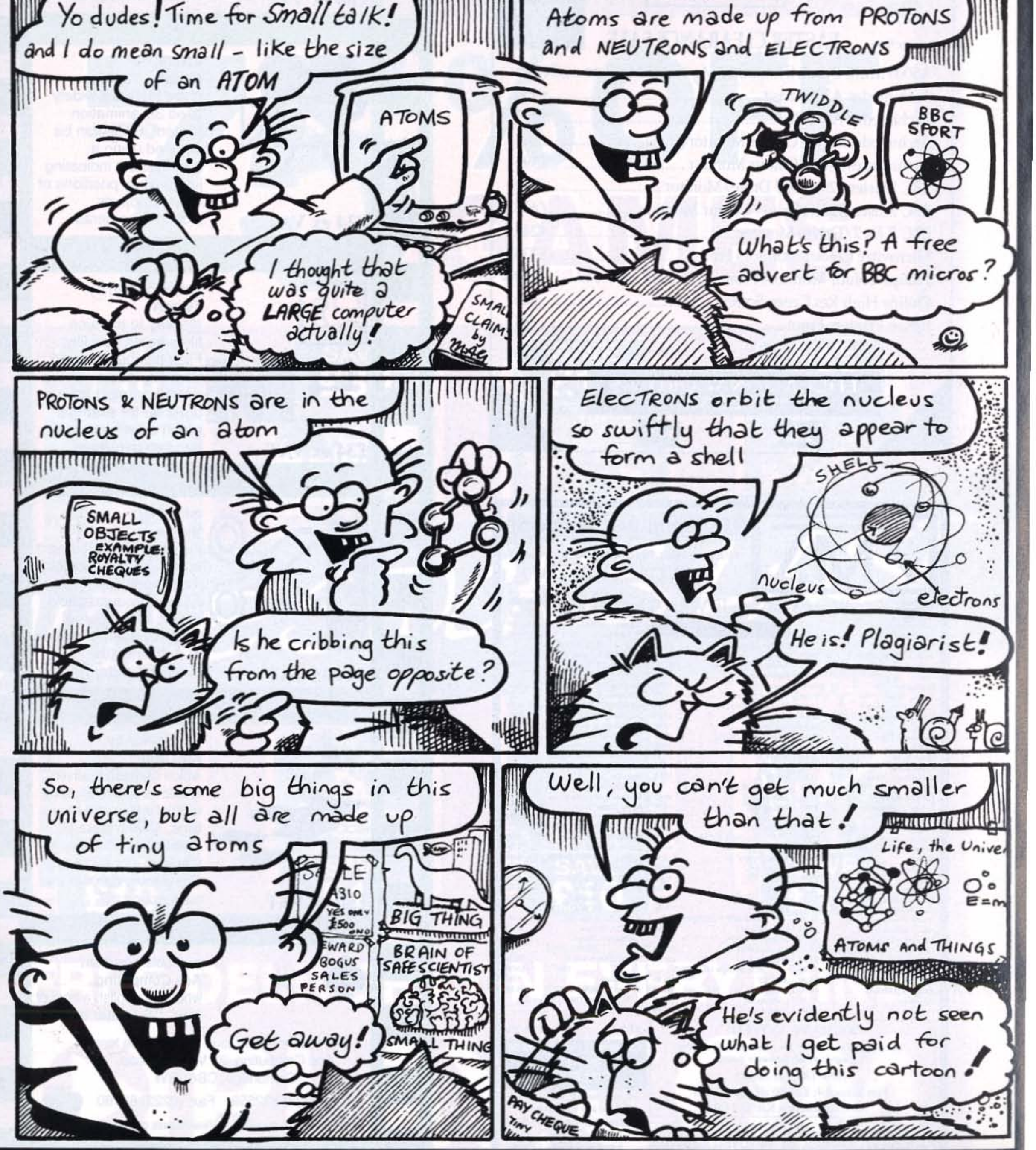
The Safe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ATOMS
I thought that was quite a LARGE computer actually!
SMALL CLAIMS by MAC
Atoms are made up from PROTONS and NEUTRONS and ELECTRONS
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PROTONS & NEUTRONS are in the nucleus of an atom
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electrons
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BIG THING
BRAIN OF SAFE SCIENTIST
SMALL THING
Get away!
Well, you can't get much smaller than that!
Life, the Unive
E=m
ATOMS AND THINGS
He's evidently not seen what I get paid for doing this cartoon!
TINY PAY CHEQUE

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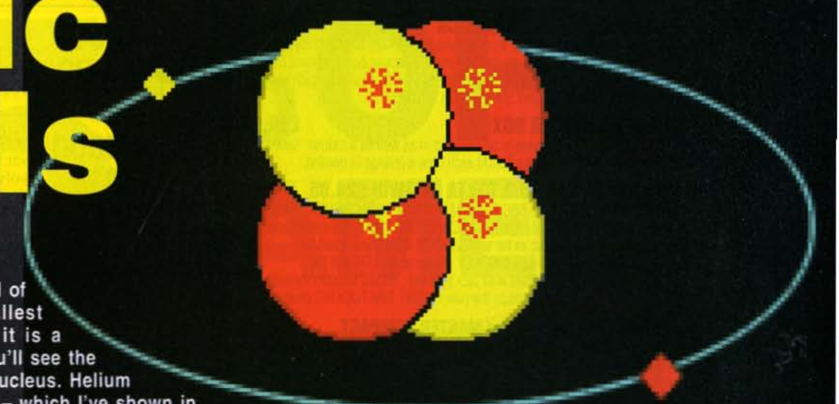
LET'S COMPUTE!

Atomic models



Hi there. It's a nice simple program this month with not too much work for you to do. In fact, you only need to type it in, save, run and enjoy. And you'll learn about the nature of substances at the same time.

It shows a model of one of the smallest atoms. In fact, it is a helium atom. You'll see the central part or nucleus. Helium has two protons – which I've shown in red – and two neutrons, yellow.

Orbiting around are two tiny electrons. These aren't like planets going around the sun because the orbits are three dimensional. The electrons move very fast and form a kind of shell all round the nucleus.

Like all models this one suffers from some weakness. To make the program fairly short, the two electrons are always opposing. But in reality they might be anywhere, although they do try to push apart from each other.

There are 92 different atoms which can be found in nature – a few more have been created in special laboratories. On many of the bigger atoms it is quite easy to remove electrons. If there are more than two electrons they form a second shell which is further from the nucleus.

Removing electrons gives the atom an electric charge. Splitting the nucleus is harder – when a nucleus is split, we get nuclear energy.

Keen programmers might like to try to create a bigger atom. How about a version of Carbon which has six protons and electrons plus eight neutrons? If you felt really adventurous you could try atoms of Uranium with 92 protons and electrons plus, perhaps, 146 neutrons.

Knowledge of atoms is seen as central in science but it is all a bit of a myth really. What you see on the screen is a model. No-one would suggest that atoms are really like it.

The truth about atoms is certainly not fully known yet. But the National Curriculum expects you to understand this model.

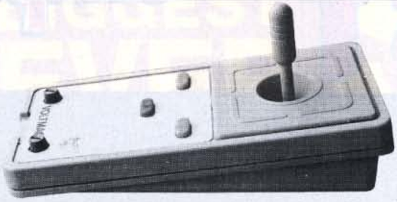
● *Next time we'll look at the way that blood gets around the body.*

```
   10 REM > <basicsave$dir>.Atomic
   20 REM The Safe Scientist
   30 REM (c) The Micro User
   40 MODE1
   50 PROCnucleus
   60 X1%=450:Y1%=450:X2%=450:Y2%=200
   70 D%=25:VDU23,255,24,60,126,255,255,
126,60,24
   80 REPEAT
   90 Y1%=Y1%-D%:Y2%=Y2%+D%
  100 PROCelectrons
  110 IF Y1%=200 OR Y1%=450 D%=-D%
  120 UNTIL FALSE:END
  130 DEFPROCnucleus
  140 PROCparticle(700,630,1)
  150 PROCparticle(700,500,2)
  160 PROCparticle(600,500,1)
  170 PROCparticle(600,630,2)
  180 ENDPROC
  190 DEFPROCparticle(X%,Y%,C%)
  200 VDU29,X%;Y%;:GCOL0,C%
  210 MOVE0,0:MOVE0,100
  220 FORN=0TO360STEP5:MOVE0,0
  230 PLOT85,SINRADN*100,COSRADN*100
  240 NEXT
  250 GCOL0,0:MOVE0,100
  260 FORN=0TO360STEP5
  270 DRAWSINRADN*100,COSRADN*100:NEXT
  280 VDU29,X%+30;Y%+30;
  290 MOVE0,0:MOVE0,20:GCOL4,3
  300 FORN=0TO360STEP5:MOVE0,0
  310 PLOT85,SINRADN*20,COSRADN*20:NEXT
  320 VDU29,0;0;:GCOL0,3:ENDPROC
  330 DEFPROCelectrons
  340 VDU29,650;565;:VDU5
  350 FORN=-90TO270STEP4
  360 P=N-180:GCOL0,1
  370 MOVESINRADN*X1%,COSRADN*Y1%:VDU255
  380 GCOL0,2
  390 MOVESINRADP*X2%,COSRADP*Y2%:VDU255
  400 TIME=0:REPEATUNTILTIME>2:GCOL0,0
  410 MOVESINRADN*X1%,COSRADN*Y1%:VDU255
  420 MOVESINRADP*X2%,COSRADP*Y2%:VDU255
  430 NEXT:ENDPROC
```

Get it right ✓

```
 10 =    0 0      230 = 4505 2
 20 =    0 0      240 = 2C83 0
 30 =    0 0      250 = F083 C
 40 = EA3A A      260 = 55B7 6
 50 = 6D09 F      270 = 17D4 A
 60 = 1E2B F      280 = 745C D
 70 = E6D2 4      290 = F65A 9
 80 = BFBA 9      300 = A77C D
 90 = E8B1 7      310 = B4A4 9
100 = 478A A      320 = 921B 2
110 = 399B 7      330 = F448 9
120 = DADE 0      340 = E221 4
130 = 80AF 4      350 = 7342 A
140 = 969F E      360 = 213A 2
150 = E3FE 5      370 = C7B2 2
160 = D9E8 D      380 = 334C 7
170 = AC89 3      390 = 5203 1
180 = ED0F 9      400 = B76B C
190 = 48A4 A      410 = C7B2 2
200 =  AF0 1      420 = 5203 3
210 = F2BE A      430 = E531 7
220 = A77C 7
```

VOLTMACE



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The lowest cost and most versatile of the Archimedes / A3000 & A5000 joysticks because it needs no interface. It Plugs straight into the mouse port and runs mouse driven programs and other software with special DELTA-CAT routines, such as the Control V option in the new FLIGHT SIMULATOR TOOLKIT.

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What to do

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GAME

Into the web

Steve Turnbull unveils the screen designer for last month's Arachnoids game

IN the March issue of *The Micro User* we presented the puzzle-arcade game Arachnoids. Its screen designs were put together using a second program that takes the slog out of it.

Screen design programs are often more complex than the games they support – and this is certainly true here. So let's take a look at the features available.

Once you have the program typed in, saved and running you're presented with an area of the screen containing a white border and a flashing block in the top left. You can use the arrow keys to move it around the playing area: Holding down a Shift key will set a wall, Control will erase it.

The rest of the program is controlled by a menu system. To select an option from a menu you must always use the upper case letter it begins with, F for File for example. Press M to enter the top of the menu tree and you can see the first four options: Object, Screen, Edit and File.

The first deals with the various game objects, like the spiders and player. If you select an object it will be placed at the current location but if there's one there already it will be removed. The teleport also requires that you set the point it jumps to.

The screen menu allows you to manipulate whole screens at a time. They can be deleted completely, new ones inserted and can be restored to the state they were in before they were last edited. In addition the walls or the objects can be cleared independently.

Each object has certain values associated with it: Energy, Speed and Data, and using the Edit menu you can enter new values for these.

The Energy value is the amount of *life* the object has or the number of times it can perform an action. This affects, to some degree, how much damage it can inflict if it attacks.

Speed controls how often the object moves while Data stands for different things – for the Teleport it's the coordinates of the target location, for example.

The File menu handles loading and saving, and you can save in two formats. The first is the internal form which can then be re-loaded into the editor for further work.

The second – Basic – creates the necessary data statements to be added to the game program so the screens can be played.

To add these lines, first load the game, LIST it and note the start line number of the DATA statements at the end. Use the DELETE command to remove all the DATA lines, then issue the command:

```
*EXEC screens
```

Replace the filename *screens* with whatever name you've used for the levels saved as Basic. Now you can re-save the whole program.

The New option clears all the currently loaded screens while Quit takes you out of the program. Neither checks to see whether you've saved your data before proceeding, so use them with care.

● *In the final part of this series we'll be looking at how object-oriented programming has been used to make the game very compact, and presenting a quicker machine code version for the 8-bit machines.*

TAKE IT EASY

If you would like to save the wear and tear on your fingers you'll find this listing – together with all the others from this issue – on this month's disc, sent free if you subscribe to *The Micro User*

```
   10 REM Arachnoid Designer
   20 REM by Steve Turnbull
   30 REM (c) The Micro User
   40 MODE4:ONERRORPROCq:REPORT:PRINT" a
t ";ERL:END
   50 PROCinit:ONERRORPROCe
   60 REPEAT
   70 IFM%=0k$="M"+ck$+ss$
   80 IFM%=1k$=FNm("Main","Object|Screen
|Edit|File")
   90 IFM%=2k$=FNm("Object","Bonuses|Hin
drances")
  100 IFM%=3k$=FNm("Screen","Clear|Delet
e|Insert|Restore")
  110 IFM%=4k$=FNm("Edit","Energy|Data|S
peed")
  120 IFM%=5k$=FNm("File","Load|Save|Bas
ic|New|Quit")
  130 IFM%=6k$=FNm("Clear","All|Objects|
Walls")
  140 IFM%=7k$=FNm("Bonus","Player|Energ
y|Weapon|Teleport")
  150 IFM%=8k$=FNm("Hindrance","Generato
r|Monster|Fungus|Barrier")
  160 REPEAToM%=M%:K%=FNg(k$):IFK%>LENk$
PROCnm
  170 IFM%=0PROCm0:ELSEIFM%=1PROCm1:ELSE
IFM%=2PROCm2:ELSEIFM%=3PROCm3:ELSEIFM%=4
PROCm4:ELSEIFM%=5PROCm5:ELSEIFM%=6PROCm6
:ELSEIFM%=7PROCm7:ELSEIFM%=8PROCm8
  180 UNTILM%<>oM%:UNTILq%:PROCq:END
  190
  200 DEFPROCe:PROCttl:tt%=0:IFERR=17IFN
OTINKEY-1PROCnm:ENDPROC
  210 ONERROROFF:PROCq:REPORT:PRINT" at
";ERL:END
  220
  230 DEFPROCq:COLOUR128:COLOUR1:VDU26,1
2:*FX4
  240 VDU23,1,1;0;0;0;:ENDPROC
  250
  260 DEFPROCinit:q%=FALSE:VDU23,1,0;0;0
;0;:*FX4,1
  270 ms%=4:mb%=8:DIMs%(ms%+1),s$(ms%+1,
mb%):H%=ASC".":xn%=126-H%
  280 FORS%=1TOms%:ss$=ss$+STR$S%:NEXT:l
x%=0:wx%=39:ty%=0:hy%=24:my%=31
  290 X%=lx%+1:Y%=ty%+1:oX%=-1:oY%=-1:ww
%=wx%:hw%=my%
  300 VDU&8017;-1;-1;-1;-1;:B%=128
  310 VDU&8117;&7E18;&FF7E;&7EFF;&187E;
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  330 VDU&8317;&B800;&FFFE;&B8FE;0;
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  370 VDU&8717;&320C;&566C;&5C3A;&3068;
  380 VDU&8817;&55AA;&55AA;&55AA;&55AA;
  390 mi%=5:DIMm$(mi%):d$="|":ck$=CHR$13
6+CHR$137+CHR$138+CHR$139
  400 READno%:num%=0:nun%=1:nux%=2:en=3:
dt=4:sp=5:mx=sp:DIMo%(no%,mx),o$(no%)
  410 FORO%=1TOno%:READo$(O%):FORI%=nun%
TOmx:READo%(O%,I%):NEXT:NEXT
  420 tt%=FALSE:ttl%=FALSE:o$(0)="Wall":
mo%=30:ty=0:xp=1:yp=2:DIMob%(mo%,mx)
  430 PROCrst(1):ENDPROC
  440
  450 DATA 8
  460 DATA Player,1,1,20,0,10
  470 DATA Energy,0,20,50,0,20
  480 DATA Weapon,0,5,10,0,10
  490 DATA Teleport,0,5,10,0,10
  500 DATA Generator,1,5,50,20,40
  510 DATA Monster,0,4,10,0,10
  520 DATA Fungus,0,8,5,0,10
  530 DATA Barrier,0,30,40,0,20
  540
  550 DEFPROCrst(Z%)es%=FALSE:L%=Z%:PROC
dl(L%):PROCnm:ENDPROC
  560
  570 DEFPROCcls(X%,Y%,U%,V%,C%)VDU28X%Y
%+V%X%+U%Y%:ww%=U%:hw%=V%
  580 IFC%>-1VDU17C%+128,17,1-C%,12:ELSE
VDU26,17,128,17,1:ww%=wx%:hw%=my%
  590 ENDPROC
  600
  610 DEFFNc(X%,Y%)LOCALA%:A%=135:VDU31X
%Y%:=(USR(&FFF4)AND&FF00)DIV256
  620
  630 DEFPROCnm:M%=0:K%=0:PROCm("Level "
+STR$L%+": Press 'M' for menu")
  640 PROCcls(lx%,my%-6,wx%/3,5,0):oX%=-
1:PROCnp(X%,Y%):ENDPROC
  650
  660 DEFPROCdl(L%):PROCcls(lx%,ty%,wx%,
hy%,1):es%=FALSE
  670 PROCcls(lx%+1,ty%+1,wx%-2,hy%-2,0)
:PROCds(L%):ENDPROC
  680
  690 DEFPROCds(L%)LOCALK%,Q%:PROCm("Dra
wing level "+STR$L%):PROCcls(0,0,0,0,-1)
  700 K%=B%:FORQ%=1TOmb%:PROCdd(s$(L%,Q%
)):NEXT:on=0:PROCdob(s$(L%,0)):ENDPROC
  710
  720 DEFPROCdd(s$)LOCALP%:IFs$=""ENDPRO
C:ELSEFORP%=1TOLENs$
  730 PRINTSTRING$(ASCMID$(s$,P%)-H%,CHR
$K%);:K%=ABS(K%-B%-32):NEXT:ENDPROC
  740
  750 DEFPROCdob(s$)LOCALL%,P%,Q%:IFs$="
"ENDPROC:ELSEL%=LENs$:REPEAT
  760 FORQ%=0TOmx:ob%(on,Q%)=FNv:NEXT
  770 VDU31ob%(on,xp)ob%(on,yp)B%+ob%(on
,ty):on=on+1:UNTILP%>=L%:ENDPROC
  780
  790 DEFFNv:P%=P%+1:c$=MID$(s$,P%,1):IF
c$<>"!"=ASCc$-H%
  800 P%=P%+2:=xn%*(ASCMID$(s$,P%-1)-H%)
+ASCMID$(s$,P%)-H%
  810
  820 DEFPROCm(k$)PROCcls(lx%,my%,wx%,0,
0):PROCcn(k$,0):ENDPROC
  830
  840 DEFPROCcn(k$,Y%)PRINTTAB((ww%-LENk
$)/2,Y%)k$;:ENDPROC
  850
  860 DEFFNm(t$,m$)LOCALo$,M%,X%:m$=m$+d
$:PROCt(t$):X%=(ww%-LENt$)/2:REPEAT
  870 o$=o$+CHR$ASCm$:P%=INSTR(m$,d$):PR
INTTAB(X%,M%)LEFT$(m$,P%-1);
  880 m$=MID$(m$,P%+1):M%=M%+1:UNTILm$="
":=o$
  890
  900 DEFPROCt(t$)PROCm(""):PROCcls(lx%,
my%-6,wx%/3,0,0):PROCcn(t$,0)
  910 PROCcls(lx%,my%-5,wx%/3,5,1):ENDPR
OC
  920
  930 DEFFNg(k$)LOCALI%:PROCcls(0,0,0,0,
```

➤

➤

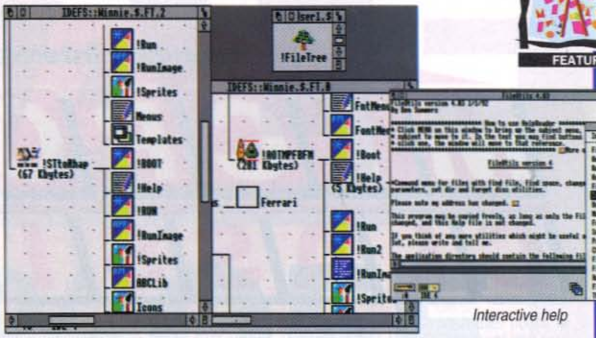
```
-1):C%=FNc(X%,Y%):k$=CHR$255+k$+CHR$13
 940 PROCttl:REPEATVDUB%,8:I%=INSTR(k$,
INKEY$4)-1:IFI%<1I%=0
 950 VDU32,8:IFI%ELSEI%=INSTR(k$,INKEY$
4)-1:IFI%<1I%=0
 960 VDUC%,8:IFI%ELSEI%=INSTR(k$,INKEY$
5)-1:IFI%<1I%=0
 970 UNTILI%:PROCttl:VDUC%8:=I%
 980
 990 DEFPROCttl
1000 IFtt%GCOL3,1:MOVEFNgx(ttx%),FNgy(t
ty%):DRAWFNgx(X%),FNgy(Y%):ttl%=NOTttl%
1010 ENDPROC
1020
1030 DEFFNgx(X%)=X%*32+16
1040 DEFFNgy(Y%)=(my%-Y%)*32+16
1050
1060 DEFPROCm0:IFK%=1K%=0:M%=1ELSEK%=K%
-1
1070 IFK%<1ORK%>4ELSEIFINKEY-1IFC%=32es
%=TRUE:VDUB%ELSEIFINKEY-2IFC%=B%es%=TRUE
:VDU32
1080 IFK%=1IFX%>lx%+1X%=X%-1ELSEIFK%=2I
FX%<wx%-1X%=X%+1
1090 IFK%=3IFY%<hy%-1Y%=Y%+1ELSEIFK%=4I
FY%>ty%+1Y%=Y%-1
1100 IFK%>4PROCnw(K%-4)ELSEPROCnp(X%,Y%
)
1110 K%=0:ENDPROC
1120
1130 DEFPROCnw(K%)IFK%<>L%PROCsl(L%):L%
=K%:PROCdl(L%)
1140 PROCnm:ENDPROC
1150
1160 DEFPROCnp(X%,Y%)LOCALD%,O%:IFoX%=X
%IFoY%=Y%ENDPROC:ELSEoX%=X%:oY%=Y%
1170 LOCALC%:VDU26:C%=FNc(X%,Y%):PROCcl
s(wx%/2,my%-5,wx%/2,3,ABS(C%<>32))
1180 IFC%=32ENDPROC:ELSEPROCcn(o$(C%-B%
),0):IFC%=B%ENDPROC:ELSEO%=FNf(X%,Y%)
1190 PROCcn("Energy:"+STR$(ob%(O%,en)),
1):PROCcn("Speed:"+STR$(ob%(O%,sp)),2)
1200 D%=ob%(O%,dt):IFob%(O%,ty)<>4PROCc
n("Data:"+STR$D%,3):ENDPROC
1210 PROCcn("To: "+STR$(D%DIV64)+","+ST
R$(D%MOD64),3):ENDPROC
1220
1230 DEFFNf(X%,Y%)LOCALO%:O%=-1:REPEAT
1240 O%=O%+1:UNTIL(X%=ob%(O%,xp)AND(Y%=
ob%(O%,yp)))ORO%=on:IFO%=on=-1ELSE=O%
1250
1260 DEFPROCsl(L%)IFes%es%=FALSE:ELSEEN
DPROC
1270 LOCALs$,C%,D%,E%,Q%,U%,V%:PROCm("R
eading screen "+STR$L%)
1280 VDU26:E%=-1:C%=-1:FORQ%=1TOmb%:s$(
L%,Q%)="":NEXT:Q%=1
1290 FORV%=ty%TOty%+hy%:FORU%=lx%TOlx%+
wx%:D%=FNc(U%,V%):IFD%<>B%D%=32
1300 IFD%<>C%PROCfix:C%=D%ELSEIFE%>xn%P
ROCfix:ELSEE%=E%+1
1310 NEXT:NEXT:PROCfix:IFs$>""s$(L%,Q%)
=s$
1320 s$(L%,0)=FNsob:ENDPROC
1330
1340 DEFPROCfix:IFC%=-1s$=""ELSEs$=s$+C
HR$(E%+H%)
1350 E%=1:IFLENs$>200s$(L%,Q%)=s$:s$=""
:Q%=Q%+1
1360 ENDPROC
1370
1380 DEFFNsob:LOCALL%,O%,Q%,V%,s$:IFon=
0=s$
1390 REPEATFORQ%=0TOmx:V%=ob%(O%,Q%):c$
=""
1400 IFV%>xn%L%=0:REPEATL%=L%+1:V%=V%-x
n%:UNTILV%<=xn%:c$="!"+CHR$(L%+H%)
1410 s$=s$+c$+CHR$(V%+H%):NEXT:O%=O%+1:
UNTILO%=on:=s$
1420
1430 DEFPROCer(t$)PROCm(t$):PROCw(300):
PROCnm:ENDPROC
1440
1450 DEFPROCw(T%)T%=T%+TIME:REPEATUNTIL
TIME>T%:ENDPROC
1460
1470 DEFPROCm1:IFK%<>3ELSEIFC%=32ORC%=B
%PROCnm:ENDPROC
1480 M%=K%+1:ENDPROC
1490
1500 DEFPROCm2:M%=K%+6:ENDPROC
1510
1520 DEFPROCm7
1530 DEFPROCm8:K%=K%+4
1540 LOCALN%:N%=o%(K%,num%)
1550 IFK%+B%=C%PROCdel(X%,Y%)ELSEIFC%=3
2IFN%<o%(K%,nux%)PROCadd(K%,X%,Y%)
1560 o%(K%,num%)=N%:PROCnm:ENDPROC
1570
1580 DEFPROCtp:tt%=NOTtt%:IFtt%ttx%=X%:
tty%=Y%:ttl%=FALSE:to%=on
1590 IFNOTtt%ob%(to%,dt)=X%*64+Y%
1600 ENDPROC
1610
1620 DEFPROCdel(X%,Y%)LOCALL%,O%,P%:P%=
FNf(X%,Y%):on=on-1:VDU32:N%=N%-1
1630 FORO%=P%TOon:FORL%=ty TOmx:ob%(O%,
L%)=ob%(O%+1,L%):NEXT:NEXT
1640 es%=TRUE:ENDPROC
1650
1660 DEFPROCadd(K%,X%,Y%)IFK%=4PROCtp:I
FNOTtt%ENDPROC
1670 ob%(on,ty)=K%:ob%(on,xp)=X%:ob%(on
,yp)=Y%:ob%(on,en)=o%(K%,en)
1680 ob%(on,sp)=o%(K%,sp):ob%(on,dt)=o%
(K%,dt):N%=N%+1:on=on+1:VDUB%+K%
1690 es%=TRUE:ENDPROC
1700
1710 DEFPROCm3:IFK%=1M%=6:ENDPROC
1720 IFK%=2PROCdls:ELSEIFK%=3PROCins:EL
SEIFK%=4PROCres
1730 PROCnm:ENDPROC
1740
1750 DEFPROCdls:LOCALQ%,S%:IFL%=ms%FORS
%=0TOmb%:s$(L%,S%)="":NEXT:ELSEFORQ%=L%+
1TOms%:FORS%=0TOmb%:s$(Q%-1,S%)=s$(Q%,S%
):s$(Q%,S%)="":NEXT:NEXT
1760 PROCrst(L%):ENDPROC
1770
1780 DEFPROCins:PROCsl(L%):IFs$(ms%,1)>
""PROCer("All levels filled"):ENDPROC
1790 LOCALQ%,S%:FORQ%=ms%-1TOL%STEP-1:F
ORS%=0TOmb%:s$(Q%+1,S%)=s$(Q%,S%)
1800 s$(Q%,S%)="":NEXT:NEXT:PROCdl(L%):
PROCsl(L%):ENDPROC
1810
1820 DEFPROCres:PROCrst(L%):ENDPROC
1830
1840 DEFPROCm4:LOCALO%:O%=FNf(X%,Y%):C%
=C%-B%
1850 IFK%=1t$="Energy"ELSEIFK%=2t$="Dat
a"ELSEt$="Speed"
1860 IFob%(O%,ty)=4ANDK%=3ELSEK%=en+K%-
1:ob%(O%,K%)=FNed(t$,ob%(O%,K%),o%(C%,K%
))
1870 PROCnm:ENDPROC
1880
1890 DEFFNed(t$,V%,Q%)PROCt(t$):REPEATC
LS:PRINTTAB(0,1)"Max = ";Q%
1900 INPUTTAB(0,3)":"t$:V%=VALt$:UNTILV
%<=Q%:es%=TRUE:=V%
1910
1920 DEFPROCm5:IFK%=1PROCld:ELSEIFK%=2P
ROCsv:PROCnm:ELSEIFK%=3PROCsp:PROCnm:ELS
EIFK%=4PROCnew:ELSEq%=TRUE:M%=0
1930 ENDPROC
1940
1950 DEFPROCld:LOCALQ%,S%:f$=FNgf("Load
 screens")
1960 Z%=OPENINf$:IFZ%=0PROCer("Couldn't
 find file '"+f$+"'"):ENDPROC
1970 FORS%=1TOms%:FORQ%=0TOmb%:INPUT#Z%
,s$(S%,Q%):NEXT:NEXT:CLOSE#Z%
1980 PROCrst(1):ENDPROC
1990
2000 DEFPROCsv:LOCALQ%,S%:PROCsl(L%):f$
=FNgf("Save screens")
2010 Z%=OPENOUTf$:IFZ%=0PROCer("Couldn'
t open file '"+f$+"'"):ENDPROC
2020 FORS%=1TOms%:FORQ%=0TOmb%:PRINT#Z%
,s$(S%,Q%):NEXT:NEXT:CLOSE#Z%:ENDPROC
2030
2040 DEFPROCsp:LOCALK%,P%,Q%,S%,N%:PROC
sl(L%):f$=FNgf("Spool screens")
2050 Z%=OPENOUTf$:IFZ%=0PROCer("Couldn'
t open file '"+f$+"'"):ENDPROC
2060 N%=32000:S%=0:REPEATS%=S%+1:UNTILs
$(S%,0)="":PROCnl:PROCo(STR$(S%-1))
2070 S%=1:REPEATP%=0:REPEATP%=P%+1:UNTI
Ls$(S%,P%)="":PROCnl:PROCo(STR$P%)
2080 FORQ%=0TO P%-1:PROCnl:PROCo(s$(S%,
Q%)):NEXT:S%=S%+1
2090 UNTILs$(S%,0)="":PROCo(CHR$13):CLO
SE#Z%:ENDPROC
2100
2110 DEFPROCnl:K%=0:PROCo(CHR$13+STR$N%
+"DATA"):N%=N%+1:ENDPROC
2120
2130 DEFPROCo(s$)IFs$=""ENDPROC
2140 LOCALL%:FORL%=1TOLENs$:PROCb(ASCMI
D$(s$,L%)):NEXT:ENDPROC
2150
2160 DEFPROCb(B%)BPUT#Z%,B%:K%=K%+1:END
PROC
2170
2180 DEFFNgf(t$)PROCt(t$):INPUTTAB(0,2)
":"t$:=t$
2190
2200 DEFPROCnew:FORQ%=0TOms%:FORS%=0TOm
b%:s$(Q%,S%)="":NEXT:NEXT:PROCrst(1)
2210 ENDPROC
2220
2230 DEFPROCm6:LOCALS%:IFK%=1ORK%=2s$(L
%,0)=""
2240 IFK%=1ORK%=3FORS%=1TOmb%:s$(L%,S%)
="":NEXT
2250 PROCdl(L%):PROCcls(0,0,0,0,-1):PRO
Cnm:ENDPROC
```

Get it right ✓

```
  10 =    0 0 |  460 = 4927 4 |  910 =  762 E | 1360 = ED0F 9 | 1810 = D1AD 1
  20 =    0 0 |  470 = 2C74 A |  920 = D1AD 7 | 1370 = D1AD 9 | 1820 = 3043 1
  30 =    0 0 |  480 = 3E77 4 |  930 = C874 C | 1380 = 84CF 0 | 1830 = D1AD 0
  40 = 88C3 3 |  490 = C8AA 5 |  940 = 8F5C 0 | 1390 = 65C0 E | 1840 = DEA4 3
  50 = E27E E |  500 = 5825 C |  950 = 41E7 E | 1400 = 3566 A | 1850 = F9BA 4
  60 = BFBA 3 |  510 = C56A 1 |  960 = AEC2 B | 1410 = B891 C | 1860 = 4A0C 3
  70 = 8CA0 0 |  520 =  7CA 1 |  970 = FB65 F | 1420 = D1AD 8 | 1870 = 5E36 C
  80 = 564B 0 |  530 = 9059 5 |  980 = D1AD 4 | 1430 = 6449 3 | 1880 = D1AD 9
  90 = D8DC B |  540 = D1AD 5 |  990 =  9C2 7 | 1440 = D1AD 9 | 1890 = 7293 7
 100 = E862 E |  550 = A392 7 | 1000 = 4201 C | 1450 = 544E E | 1900 = A06F D
 110 = 3E21 A |  560 = D1AD F | 1010 = ED0F A | 1460 = D1AD D | 1910 = D1AD D
 120 = A4B3 B |  570 = A4CE 0 | 1020 = D1AD 0 | 1470 = 2D50 A | 1920 = 493B 4
 130 = D6CD D |  580 = 2D01 0 | 1030 = DE34 7 | 1480 = DF7F 2 | 1930 = ED0F E
 140 = BD86 5 |  590 = ED0F 6 | 1040 = A857 B | 1490 = D1AD 0 | 1940 = D1AD 9
 150 = 15E1 F |  600 = D1AD 0 | 1050 = D1AD E | 1500 = 135B 2 | 1950 = 12FF 3
 160 = 2D26 A |  610 = 833D A | 1060 = 4287 5 | 1510 = D1AD 6 | 1960 = 3781 B
 170 = 7E8E C |  620 = D1AD 4 | 1070 = 1996 A | 1520 = 2775 D | 1970 = 94F1 2
 180 = 2F13 9 |  630 = AD64 2 | 1080 = D953 B | 1530 = 7262 0 | 1980 = BDB8 D
 190 = D1AD 2 |  640 = 3A15 B | 1090 = 2C6F F | 1540 = EC26 3 | 1990 = D1AD 1
 200 = DFE7 4 |  650 = D1AD 2 | 1100 = EAAB 1 | 1550 = 8B68 8 | 2000 = 984B 3
 210 = 2311 3 |  660 = 8E20 2 | 1110 = 55CA D | 1560 = E16B 2 | 2010 = 78E1 A
 220 = D1AD 5 |  670 = 9C88 6 | 1120 = D1AD E | 1570 = D1AD A | 2020 = 7FD2 E
 230 = 2866 2 |  680 = D1AD 7 | 1130 = 917C B | 1580 = 2A5A 0 | 2030 = D1AD 4
 240 = 644A 3 |  690 = 1C15 A | 1140 = 5E36 3 | 1590 = 3159 5 | 2040 = 6CC3 6
 250 = D1AD 1 |  700 = 1541 D | 1150 = D1AD 1 | 1600 = ED0F D | 2050 = 78E1 F
 260 = 9F1C B |  710 = D1AD 5 | 1160 = 18D5 7 | 1610 = D1AD 8 | 2060 = 3BCE 9
 270 = C7D8 A |  720 = F8C8 9 | 1170 = 4F76 2 | 1620 = F05D 4 | 2070 = FF83 3
 280 = 8C28 2 |  730 = 49D3 7 | 1180 = 9178 9 | 1630 = 7C99 F | 2080 = 85AA A
 290 = CEAD D |  740 = D1AD F | 1190 = 1F95 6 | 1640 = 1872 C | 2090 = DE17 A
 300 = ADE1 6 |  750 = E7B0 1 | 1200 = F71D 6 | 1650 = D1AD 7 | 2100 = D1AD 5
 310 = 4746 4 |  760 = 2B5B 0 | 1210 = B57C 8 | 1660 = D32D 1 | 2110 = 7A5F 9
 320 = E665 7 |  770 = 57B6 9 | 1220 = D1AD 2 | 1670 =  A74 C | 2120 = D1AD F
 330 = 35B3 7 |  780 = D1AD 1 | 1230 = DE2C 6 | 1680 = AF6B E | 2130 = 2D13 8
 340 =  11E C |  790 = 74A3 5 | 1240 = 247C 8 | 1690 = 1872 3 | 2140 = 4065 E
 350 = 6735 3 |  800 = 9C60 0 | 1250 = D1AD 4 | 1700 = D1AD 3 | 2150 = D1AD 5
 360 = EBE4 7 |  810 = D1AD 8 | 1260 = DB2E 6 | 1710 = 99A1 E | 2160 = 936B E
 370 = 5A53 7 |  820 = 94E8 C | 1270 = 20A3 C | 1720 = E124 3 | 2170 = D1AD 6
 380 = 2808 4 |  830 = D1AD 2 | 1280 = 4259 F | 1730 = 5E36 2 | 2180 = 7586 2
 390 = 5801 5 |  840 = E93B D | 1290 = FECC 2 | 1740 = D1AD 5 | 2190 = D1AD F
 400 = 2A83 A |  850 = D1AD F | 1300 = 80C6 2 | 1750 = 4884 2 | 2200 = 1DA0 3
 410 = 55A9 6 |  860 = 8FF7 3 | 1310 = 6461 B | 1760 = 8359 9 | 2210 = ED0F C
 420 =  196 4 |  870 = AF76 D | 1320 = 648E B | 1770 = D1AD 5 | 2220 = D1AD A
 430 = BDB8 5 |  880 = 1680 8 | 1330 = D1AD C | 1780 = 33B6 C | 2230 = 8C8C 7
 440 = D1AD 5 |  890 = D1AD 0 | 1340 = 1B14 B | 1790 = 8C04 E | 2240 = 5A38 2
 450 = A148 6 |  900 = E58F 7 | 1350 = E5FB 3 | 1800 =  74D 5 | 2250 = 92CE 3
```

PD-go round

Teri Paul looks at some of the more professional quality offerings


IDEFS::Minnie.$.FT.2
!Run
!RunImage
!Sprites
Menus
Templates
!STtoRhap
(67 Kbytes)
!BOOT
!Help
!RUN
!RunImage
!Sprites
BBCLib
Icons
!FileTree
IDEFS::Minnie.$.FT.8
!BOTMPFBFN
(281 Kbytes)
Ferrari
FatMenu
FontMen
!Boot
!Help
(5 Kbytes)
!Run
!Run2
!RunIma
!Sprite
FileUtils
HelpReader
Info
FileUtils
HelpReader
Revision history
How to use it
File menu
Interaction help
Hotkeys
Main menu
Forget disc
Set dir
Parameters
Change type
Find space
Find file
Archives
Filedata format
The author

The file tree window

Interactive help

AS programmers seem to be cutting their teeth on PD buyers, you can usually make good use of their expertise before they are snatched up by commercial software houses.

Though this means that they are unlikely to produce any more PD programs, it does ensure that quality programs are increasing in number as more and more people try to prove themselves to prospective employers.

Some programs make life an awful lot easier for everyone. FileTree 1.01 from RMLPD is a typical example. Written by John Tytgat and released by BASS – Belgian Archimedes Software-writers Society – it allows you to create drawfiles showing the file tree structure of any disc.

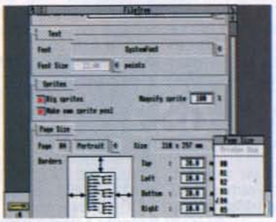
It's probably of most use for hard disc users. Just load it in the usual way and you'll find a window. At the top of this you fill in the directory to be scanned and what you get is the contents of the directory, plus any subdirectories, as a drawfile. You can choose the text font and its size.

When printed, your customised text will be on the left of each filename, directory or application icon. You can also choose between two sizes of sprite – small and large. The small sprite is recommended if you are concerned about the size of the drawfile, but the large sprite looks better when printed.

Big sprites

It is also possible to enlarge or shrink the sprites. The default size 100 per cent but if you opt for 0 per cent no sprites are placed in the drawfile. For the *Big sprites* option a reasonable *Magnify sprite* option is 50 per cent.

If you don't want the default sprites to be used you can *Make own sprite pool*. This is done by merging each application's !Sprite file during its scan through the directories. This does take more time but looks better.


FileTree
Text
Font
SystemFont
Font Size
points
Sprites
Big sprites
Magnify sprite
Make own sprite pool
Page Size
Page
A4
Portrait
Size
Borders
Top
Left
Bottom
Right
Page Size
A0
A1
A2
A3
A4
A5

Printing the file tree

Other options let you decide the paper size, page orientation and border size. Some objects in the drawfile may cross the boundary, but the printer driver will automatically cut the print borders off. But these objects are repeated so it's very easy to make a large poster of the FileTree.

FileTree also has a facility which allows you to count directories as well as files. More accurate than the Risc OS version it can count by the sector instead of by file length.

This is a very finished and easy-to-use utility which allows you to compress your tree – useful for full hard discs – to fit as much as possible on one page with the alphabetic order of the file unaltered. You can also look inside applications without stopping the scan.

Once you have made all your choices drag the icon from the bottom of the window into a filer window, or press OK and off it goes. You can use the resulting drawfile in the usual way – print it or import it into other applications.

The print quality is not too good as the drawfiles use a maximum of 16 colour sprites. You can force your printer to emulate this, and step-by-step instructions are given in the comprehensive help file.

FileUtils 4.03

Now you have a nice breakdown of what is where, you might want to change things around a little. Ben Summers' FileUtils is now in a new version and is a very professional looking piece of software indeed, with more utilities and options than earlier versions.

The superb on-line interactive HelpReader – also written by Ben – makes this nicely constructed program useful for both technical and non-technical Archimedes owners.

Click the Menu button on the iconbar icon and you will be presented with a menu of commands. Or drag one of your files to the FileUtils icon and a menu will appear allowing you to dump, find info, open the directory or kill.

Looking at the FileUtils menu in more detail will give you the ability to change file type, set the directory, set the parameters, find space or find a file to name but a few.

If you are new to this program, click on Help in the menu. Two windows will appear: The vertical one lists the areas you can get help on – the *commands, as well as history of the program and so on. The horizontal window gives information on the areas you select in the vertical window. You can just read the help file from start to finish with buttons every now and again which, when selected, will give you more information on a particular area. Excellent.

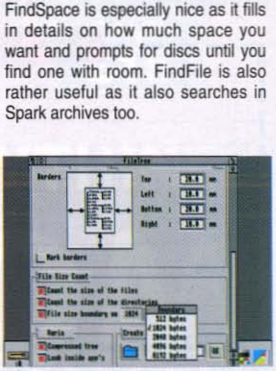
The utilities are very useful and can be accessed via hotkeys as well as via the menus. Forget Disc is one which is particularly nice. Acting in a similar way to Dismount on a drive, its options allow you to select which system variable you want to get rid of. It then dismounts and unsets any system variables which reference it.

SetDir is for people who need to set a current directory from the Desktop, while Parameters lets you run or load a file or application with parameters. For instance, if you load FileUtils from the command line with the Find File window open you'd use the command:

```
*Run !FileUtils -f
```

But you can't do this on the desktop. Parameters, however, lets you toggle between *Run and *Load.

ChangeType is the program I personally use the most along with FindSpace and FindFile. The names will give you their purpose, but FindSpace is especially nice as it fills in details on how much space you want and prompts for discs until you find one with room. FindFile is also rather useful as it also searches in Spark archives too.


FileTree
Borders
Top
Left
Bottom
Right
Mark borders
File Size Count
Count the size of the files
Count the size of the directories
File size boundary on
1024
Boundary
512 bytes
1024 bytes
2048 bytes
4096 bytes
8192 bytes
Create
Compressed tree
Look inside app's

Good news for Bs

Neil Gorin, the author of Turbo Publisher wrote to me recently with good news for BBC B and B+ owners. Turbo Publisher is a DTP package which is now in version 2.01.

With a complete manual on the disc, as well as two sizes of screen dumping, additional bubble text font and some tidying up of problem areas, the new version works on 80 track DFS systems – a copy is on this month's subscription disc.

Neil is no longer programming for the BBC Micro so if you want to develop the program further – what about an 80 column version – you can do so with Neil's blessing. Just make sure that you credit the documentation and software with his name and address.

Has upgrading your BBC Micro given you hardware you no longer need? Or have changing interests left you with unwanted software?

MICRO USER CLASSIFIEDS

- A3000 2MB RAM 42 Mbyte IDE hard disk Impression Genesis Euclid games Philips monitor deskset £950. 0734 560559.
- For Sale for the BBC B Computer. AMX STOP PRESS Package £25. AMX Design Package £45. Kempston PRO Joystick £10. Wordwise Plus ROM £25. Pace Linnet Modem and Software £125. Contact Tim on Tel: 081 569 3244 Evenings.
- AMAZING! Master 128K Dual DD/DS Disk drive, AMX 3, Many utilities/ roms: ADT, Dumpout 3, Advanced 1770 DFS, etc + 256K memory expansion cartridge, Lightpen and literally HUNDREDS of games! Quick sale preferred. £350 o.n.o! Tel: 081 363 1477.
- Archimedes 410 ARM3 40MB Hard Disk £975 Archimedes colour monitor £100 Tel: 0793 731355
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- Upgrade sale of BBC stuff. Software on ROM disc, tape. Hardware including D/Drives, swram zif, edrom blower, etc. For list Tel: 0603 898420.
- Master 128K, colour monitor, dual 40/80 DS drives, taxan KP 810 printer, teletext adaptor, eprom programmer, manuals, software including Interword, Printmaster £600 Tel: 081 874 5457.
- Archimedes 310, Taxan multivision 770. £750 Tel: Bridgnorth 0762 765812.
- Wanted Acornsoft Comal ROM for BBC B Tel: 0382 562328 after 5 pm.
- A3000 Learning curve 2MB Serial Upgrade Acorns DTP boxed £650 Tel: 0483 772750.
- S Cars, B Buggy, Thundermonk, Nevryon, Interdictor, Arcsoccer, Manonited, Lemmings, Pacmania Powerbandur F-Type, Bughuntii, Ballarena £15 each. Tel: 0480 67229 for details.
- Electron Plus-1 view, software, books, colour TV monitor, + MORE: £150 - 0874 730751.
- BBC-B c/w ATPL sideways ROM board, Watford 32K RAM card. Acorn Datacorder dual 40180 track self powered disk drive. Hires colour monitor. Glare screen user guide books £200 Tel: 081 455 8831.
- BBC-B Issue 7 £170 incl manual, joysticks Sega Master system 3 games £50 Chepstow (0291) 620063.
- A3000, 2MB, Acorn monitor and stand, manuals and discs. All good condition £650 ono Tel: 0785 760082.
- A3000, TV modulator, 2MB serial port word processor, DTP and loads more! Only £520 ono Tel: 0580 893 462 ask for Nick.
- For Sale BBC Master 128. Dual disc drives. Wapping editor and quest mouse. Lots of software on 5 1/4" and 3" discs. Panasonic KXP-1081 printer £300 ono Tel: 081 647 7309.
- AMX mouse £15 wapping editor £30 stop press £15 joystick £10 0773 856507.
- Master Compact Computer and green monitor, 3.5 720K floppy drive AMX mouse printer lead 12 disks full of software, Micro User mags £200 Ring Chris Davies at work (STORS) on 0249 654175.
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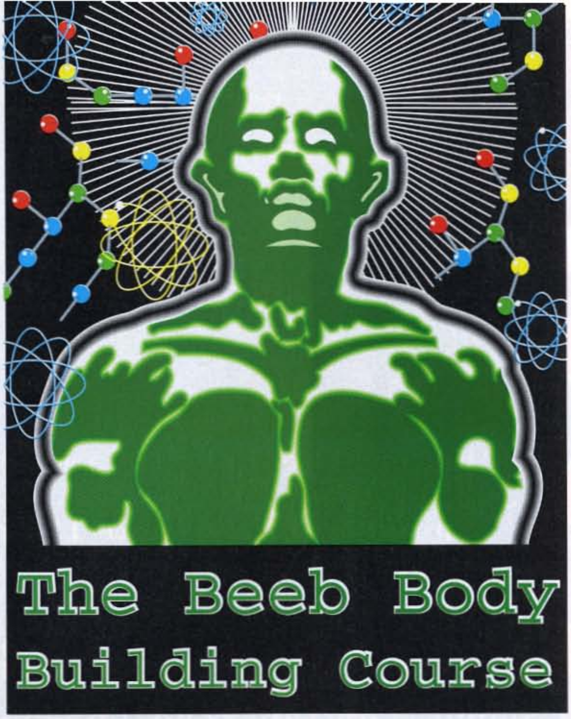


The Beeb Body Building Course

Reverberation

Mike Cook dares you to enter the echo chamber

IN the last of this series let's look at how to use the Body Build Sound Sampler for real time processing with the Acorn 32-bit machines. This will allow us to generate an echo chamber, shift the frequency of the voice in real time and hear our words backwards.

Just too clever

It is a sad fact of life that the more intelligent computers get, the harder it is to get them to do what you want. I tackled a similar project for the Model B and it was quite straightforward.

However it is almost impossible using the Risc OS machines. The problem is that the designers had not considered that anyone would want to use the machine in this way – but I do.

In principle what we need to do is quite simple: Gather sound samples and place them in memory. Then take them out of memory and present them to the D/A converter, all under program control. Not too much to ask you might think.

The main problem is that there is no way that the software can get at the sound outputting D/A converter, it doesn't exist in the memory map. The way the ARM chip set is designed is that the hardware directly accesses the computer memory and transfers it to the sound output. So in order to do what we want we have to understand this hardware.

In the MEMC – memory controller chip – there are two registers defining the start and end of an area of memory containing sound data – sound buffer pointers. In the VIDC – Video controller chip – there is a register defining the time delay between samples. Finally in the IOC (Input/output controller) are some register bits controlling the operation of the sound buffers. This is what we have to sort out.

Now we can't actually get at the MEMC sound buffer pointers, what we can access are the pointers to the next buffer. However, the MEMC is not actually connected to the data bus so how can we get data into it? Well this is achieved by using the address bus.

To set a buffer pointer we do a write operation to an address where the lower bits correspond to the pointer value and the upper bits define what pointer we want to change. It does not matter what we actually write to this address, as I said, the data bus is not connected.

Memory translation

This access of the MEMC can only be achieved in the supervisor mode, but we know how to get into that from the previous software we have written. However there is a further problem in that the sound pointers require their address in physical memory not logical memory.

Physical memory is the address where the actual memory resides. On the other hand logical memory is where the program thinks the memory is located. The main job of the MEMC is to perform a translation between the two. This allows programs to multitask, and for them all to think they are occupying the same area of memory.

However, we can use a trick we learnt about last month, the physical and logical memory used for the display are next to each other to allow for fast scrolling. So therefore physical memory location zero is at the top of the screen. We can write directly into this by our program using address &2000000 and read it by setting our sound pointer using address 0.

The time between samples being output is controlled by the VIDC, which is connected to the data bus but appears as only one accessible memory location. In order to get information into this you need to encode the bits defining the register at the top of the data and the value at the bottom.

For the sound frequency register the top eight bits need to be &C0, the bottom eight bits containing the data

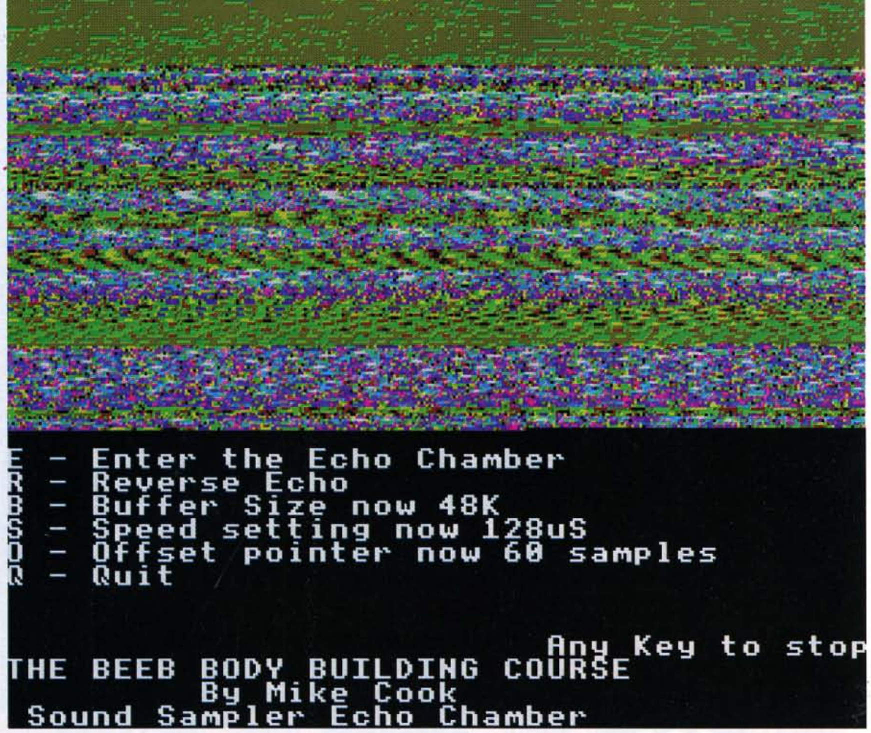
➤

and bit 8 containing a logic one. None of the other bits matter. The value we put in here is that of the sample delay in micro seconds minus one. Therefore for 128uS delay we need to put in a value of 127.

The sound digitising software is similar to that we have seen before, however in order to match the output speed we set our timer to a value of 256. This value divided by two gives the input rate in micro seconds. However, the internal D/A chip requires the 8-bit data in rather a strange format – the least significant bit is the sign bit, our most significant bit.

Also the data needs to be in log format. Fortunately there is an operating system call to convert our linear data into this strange log format. So before we digitise the data we build up a table of all possible values and then simply look it up in that table when we have digitised each sample.

Remember all this action is going on with the interrupts disabled, so the problem arises of how to stop it all. Well we could use the reset button but that does not put us back in the program. However, in the IOC chip is a serial interface that gets information from the keyboard. One of its registers has a bit that says that new data has arrived from the keyboard.



```
E - Enter the Echo Chamber
R - Reverse Echo
B - Buffer Size now 48K
S - Speed setting now 128uS
O - Offset pointer now 60 samples
Q - Quit


                         Any Key to stop
THE BEEB BODY BUILDING COURSE
         By Mike Cook
 Sound Sampler Echo Chamber
```

The echo chamber control with sample above

All we need to do is to monitor this at the end of each buffer to see if a key has been pressed. We can then exit our machine code whenever a key is pressed. Note that the keyboard circuitry also handles mouse movements so we will exit if the mouse is moved as well.

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With that background information we can look at the program. This basically inputs sound at the same time as outputting it. When the sound is input it is placed in a buffer, which happens to be screen memory so we can see coloured pixels appearing. This area of memory is also used to output data to the sound chip.

Shifty pointers

If there is a difference between the input and output pointers there will be a delay between the input and output and hence an echo will be generated. The length of delay of the echo is determined by the size of the buffer and the space between pointers. If the input and output speed is not the same this will shift the length of the echo gradually over time.

If there is a great difference between the two speeds there will be a frequency shift between the input and output. What this program does is to allow you to control these parameters to give you lots of different effects.

For example to achieve a real time increase in your voice set a small buffer 0.25k and a speed of 100 and it will sound like you have been breathing helium.

However, a speed of 150 will give you a low growling voice. Slight smaller shifts might even make you sing in tune!

For a good echo set the buffer to 40k, speed to 128 and offset to 1. Now the offset is the start the output is given, a value of 1 means they start off at about the same place. However, here's the snag with clever hardware: Although the input and output timers are set to the same value they do drift out of synchronisation.

I know they shouldn't but there you have it, I think it might be something to do with the direct memory access but I am not sure. If anyone knows why this happens I would be very glad to hear from them. Therefore with these settings the echo will very gradually get longer.

A speed setting of 127 will produce an echo where the delay gradually gets shorter, but if the two pointers start off the same this shortening soon wraps round into a long delay, but still getting shorter all the time. Giving a large offset of about 300 will set up an initial delay about the size of the buffer itself.

One other feature of the program is that we can enter sound data backwards, that is we decrement the buffer pointer instead of incrementing.

This not only results in a variable delay but all the sound is backwards. It is fun to try to speak backwards and hear it the correct way round. The best way to try this is to say it normally and try to copy the sound.

● *Well that about wraps up the sound sampler for the present, next month something completely different.*

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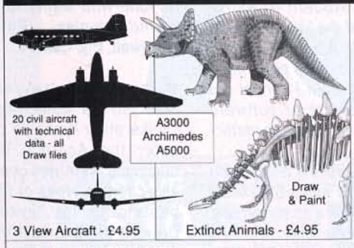
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Solidisk solution

MY BBC Micro has an STL 1770 DFS produced by Solidisk and on several occasions I have been unable to run or verify my subscription disc. Europress Direct have always replaced it without question and I usually find the second one is alright.

*However the last time it happened I did some investigating and discovered that the disc worked perfectly on the beebs at my college. Back home I discovered that the *DSTEP command solved the problem. I hope I'll never have to bother you again.* – **C. A. McGaughey, Canterbury, Kent.**

● We're glad you got the problem solved. This is probably a good time to remind subscribers that if a disc has been bent or otherwise damaged in the post, just return it to Europress Direct at the Ellesmere Port address. Any queries about the technical content of the disc should be directed to ***The Micro User*** at Adlington.

Paper tiger

THERE was a very nice little program in the December 1991 issue of The Micro User *for producing manuscript paper. Unfortunately it only works if you happen to have a printer with a particular set of downloadable characters, accessed using ESC"m".*

I think this is stretching the concept of Epson-compatibility a bit far as quite a lot of Epson-compatible printers don't have this facility.

I have a Star NL10, a fairly typical Epson-compatible, and found it not too difficult to redefine the 11 characters, A to K, to give me the shapes I needed. The listing shows the modifications required. – **F. Bridges, Kingswinford, West Mids.**

```
360PROCline(65,71,68)
380PROCline(66,72,69):NEXT
400PROCline(67,73,70):PRINT'''''
450PROCline(66,72,69)
470PROCline(66,72,69)
490PROCline(66,72,69):NEXT
530FOR J%=1 TO S%:VDU74:NEXT
550FOR K%=1 TO L%:VDU74:NEXT
590DEFPROCjoin:VDU75
630VDU75:NEXT:PRINT:ENDPROC
670VDU2,1,27,1,108,1,8,1,4,1,27,
1,56
```

Delete line 700 and add the following:

```
700VDU1,27,1,58,1,0,1,0,1,0:REM
Destroy any existing user-define
d characters
710VDU1,27,1,58,1,0,1,65,1,75:RE
M Redefine characters 65 to 75
720RESTORE
730FOR N=65 TO 75:VDU1,139
740FOR M=1 TO 5
750READ Z
760VDU1,Z,1,0
770NEXT
780READZ:VDU1,Z:NEXT
790VDU1,27,1,37,1,1,1,0:REM Sele
ct download character set
800DATA0,0,31,16,16,16
810DATA0,0,255,16,16,16
820DATA0,0,240,16,16,16
830DATA16,16,31,16,16,16
840DATA16,16,255,16,16,16
850DATA16,16,240,16,16,16
860DATA16,16,31,0,0,0
870DATA16,16,255,0,0,0
880DATA16,16,240,0,0,0
890DATA16,16,16,16,16,16
900DATA0,0,255,0,0,0
910ENDPROC
```

Blankety blank

MANY thanks for publishing my Screen Blanker program in the January issue of The Micro User. *However one small error appears to have crept in because on running the program it assembles the machine code and then crashes with the message:*

```
No such variable at line 1640
```

A simple change to this line will correct the problem:

```
PRINT'"If no key is pressed fo
r ";STR$(delay);" minutes"'"th
en the screen will blank itsel
f"'"automatically. Pressing an
y key will"'"restore the displ
ay."
```

I hope this helps. – **Steven Flintham, Skegness, Lincs.**

Seventh heaven

THE print quality of black text on my Star LC24-200 colour printer was beginning to look a bit grey so I decide a new ribbon was in order – or was it?

While scanning through the manual I noticed the instructions for setting up to seven (including black) colours – the print head will use one of seven vertical positions on the ribbon.

But for text I use a black-only ribbon and that means the printer is only using one-seventh of the ribbon to print. If you have one of these printers and follow the instructions in the manual you can force the printer to use one of the other six positions – a completely unused portion of the ribbon.

You can do this six times and extend the life of the ribbon enormously. – **Alan Fairclough, Wirral, Merseyside.**

Lithuania link

I AM a student of Astrophysics at the Vilnius University in Lithuania and a friend from Canada has given me a BBC Micro but I cannot get any hardware or software because of currency restrictions.

I think I am the only person in Lithuania with a BBC Micro and would like to correspond with anyone else who has one. – **Kriukelis Saulius, P.O. Box 1172, 2001 Vilnius, Lithuania.**

● Our thanks to VicBug in Australia for alerting us to Kriukelis' plight. We don't know what hardware he has, or whether he has a disc drive or cassette but if you'd like to give him a hand, drop him a line.

Sample standards

I HAVE the Body Building Sound Sampler from the December 1991 issue of The Micro User *and I've discovered that the public domain application !DSEdit, by Simon Williams, is compatible with the samples saved by !BodySamp.*

With this utility you can: Cut unwanted noise from the beginning and end of the sample, add echo, reverse it, apply many other special effects and then save again in a format that can be put back into !BodySamp – if you want to.

Now I just use Mike Cook's !BodySamp for getting the samples and !DSEdit to get them to perfection. I'd definitely recommend a copy to anyone who wants to edit sound samples. – **Patrick Cornwall, Ely, Cambs.**

● The ability to transfer the files isn't a coincidence. Unlike other types of computer the Acorn's 32-bit machines were designed to allow certain types of file to be standards: Text, Sprite and Drawfile are the main three. This provides a sytem that allows different applications to transfer data between them. The sound sample file is also a standard type.

Is it Wirth it?

I WOULD describe myself as a hardened BBC Basic programmer, after eight years of experience, as well as being proficient in a number of other languages. So it came as shock when I found I had to leave my favourite machine, a BBC A3000, to program a PC in Modula-2.

Modula-2 was developed by Nicklaus Wirth after his experience creating Pascal, which BBC Basic is heavily based on. The main principle behind the language is that individual program modules are created that are totally independent of each other apart from a carefully specified interface.

This ensures that side-effects, like routines accidentally changing variables that they shouldn't, can't happen.

Thankfully my PC experience was short-lived, I certainly prefer the A3000, but I discovered that Modula-2 is the best high-level language on any computer, though C hacks will try to convince you otherwise.

So I tried to find Modula-2

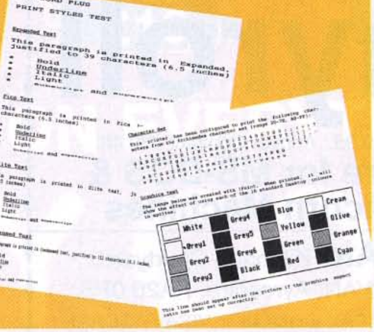
Solving troubles with bubbles

YOUR letter writer, Andrew Murphy from the January issue, appears to have had similar trouble with his Canon BJ10e bubblejet printer as I have.

It seems that not all the Epson control codes are implemented, especially in Mode 2 which emulates the high resolution Canon BJ130 rather than the 9 pin emulation of the IBM Proprinter. Italics are not available, for example, and the printer reset command is different.

I was unable to print the 1st Word Plus PrintTest *data with any of the drivers supplied. However by modifying the PrData file inside the PrinterDM application it was possible to achieve good general results – as you can see. A lighter and more economical image is easily achieved by permanently setting DIP switch 2 on, this is adequate for most purposes.*

If you get very fine lines – 1/360 inch – on your printout it will probably be a blocked jet, the manual explains how to clear this unusual occurrence. – **D. A. Hendley, Cranleigh, Surrey.**



1ST WORD PLUS

PRINT STYLES TEST

Expanded Text

This paragraph is printed in Expanded, justified to 39 characters (6.5 inches)

- Bold
- Underline
- Italic
- Light

Pica Text

This paragraph is printed in Pica

- Bold
- Underline
- Italic
- Light

Elite Text

This paragraph is printed in Elite text,

- Bold
- Underline
- Italic
- Light

Condensed Text

- Bold
- Underline
- Italic
- Light

Character Set

Graphics test

This line should appear after the picture if the graphics aspect ratio has been set up correctly.

Drawing things out

PRIZE letter

I'VE just read B.J. Hogg's letter in your January issue about printing A0 drawings from !Draw on to an A4 printer. I'm amazed that Acorn could not help as someone there showed me a number of tricks with !Draw.

The method of grouping objects and then moving them into the area bounded by the print border certainly works. It is even better if you are using continuous fanfold paper to adjust your printer driver so that it thinks your paper is about 1.5 metres long.

The actual size can be altered to match the A size you are using. Then you can print out your image in a number of long strips which are easier to glue together than lots of little A4s. It also means you can leave your printer to get on with printing for ages and do something more interesting than having to sit and restart it after every page.

An interesting trick is to change the page height on the printer driver to 1200mm. Then in !Draw select page size A0, landscape with print borders shown. Then zoom to 1:8. A grey rectangle will show the area that will print out. Then type text in with a font size up to 400. Yes, four hundred – the bottom entry in the font size list allows you to type any size you want.

Keep the text inside the grey rectangle. Because you have zoomed, the text will not look very big on the screen but it will print out sideways on the paper. Each letter can be up to the width of the paper. You can then print out instant banners. It works best with a Font Manager 2.44 otherwise the curves of the letters are very jagged.

I would also like to warn people against making a dangerous mistake like I have just made tidying up my hard disc. I was moving files into a directory by dragging them with Shift held down. In a moment of madness I dragged the directory itself into the viewer thus putting the directory into itself. The disc drive was active for ages.

As I was moving the files rather than copying them the computer carried on putting the directory into the directory but kept shifting the files to the next level down. It eventually crashed out. I then attempted to find my files.

Each time I opened a directory I found another one inside. There is no way of retrieving the files as the nesting becomes too deep and the command string too long. – **Keith Butcher, Enfield, Middlesex.**

● If you fall into this recursive trap you can use Escape to get out of it – Risc OS 3 actually stops you doing it.

for my machine and couldn't. I eventually went to Acorn but they have said that there's been almost no enquiries about it so there are no plans to implement it.

So if you want Modula-2 write to Acorn and tell them. – **M. A. Ford, Barnsley, South Yorkshire.**

Teletext options

LIKE thousands of others I bought a teletext adapter for my BBC Micro because of all the free software that was available.

The BBC discontinued its Ceefax telesoftware and now the only useful thing we can do is save and print these pages as screen dumps. It would be a lot more useful if the text could be downloaded into a file readable by a word-processor such as View or Mini Office II.

Could you suggest a way that this could be done so that information could be edited before being saved or printed. – **Alan Clement, Coventry.**

● The solution is quite simple: Just load the saved page into your wordprocessor as if it were a text file then delete the control codes as you edit the text. Wordwise Plus is the best program for this because it turns control codes into vertical bar characters, but the other programs should be fine. With View use the READ rather than the LOAD command.

Oops

I HAVE just finished typing in and checking the four listings of the game Arena in the January '92 issue of The Micro User, *but I cannot get it to run on my BBC Master.*

I note that the text mentions that Listing II should have the three extra lines in the panel added to it but there is no panel.

Listing III has nothing printed on line 340 and my checksums do not agree for lines 290, 340, 350, 1580, 1790, 1850 and 2010. I hope that you can help me to get the game running. – **Eris Ellis, Mirfield, West Yorkshire.**

● The missing panel should have contained the following lines:

```
31 &FE34=&18
32 FOR I%=0 TO 31:J%=(I%*2)+&C375
33 [OPT 2:EQUB(J%DIV256):EQUB(J%M
OD256):]:NEXT
```

Line 340 contains just a space. As for the other lines I can only assume that there is a difference between what you have entered and what's in the original program.

ALL programs printed in this magazine are exact reproductions of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency.

Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we cannot answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.

Electronic aids

MY computer is an Electron and I have some questions about programming it.

Is it possible to have the line numbers appearing on the screen while a program is running to show where the computer has got to, or to show what each line is doing? Although I think I found this utility a while ago I can't find any trace of it now. – **Ross A. Little, Great Yarmouth.**

● There is a Basic command, TRACE ON, which will list line numbers as they are executed after RUN is typed. The only problem is that the numbers are printed immediately after the last character so if you have lots of PRINTTABs the numbers will appear all over the screen.

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Fontastic

I AM writing in reply to a letter in the January issue from K. McLeod about having too many fonts to fit on to a single floppy disc.

I have recently discovered a way to daisy-chain font directories together. To do this load the !Run file from the !Fonts directory – accessible by Shift+double-click on the !Fonts directory icon – into !Edit and locate the following line:

```
SetMacro Font$Path
<Font$Prefix>
```

and add the following to it:

```
,ADFS::Fonts2.$.!Fonts2
```

where adfs::Fonts2 is the disc name and $.!Fonts2 is the directory containing the extra fonts, although the fonts don't have to be in a directory on the second disc at all. This procedure can be used any number of times to add other fonts discs by changing the disc and the directory names. – **Mark Jennings, Fleet, Hants.**

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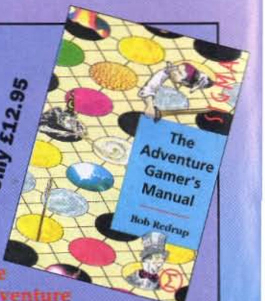

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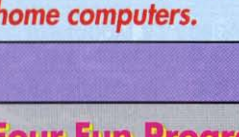

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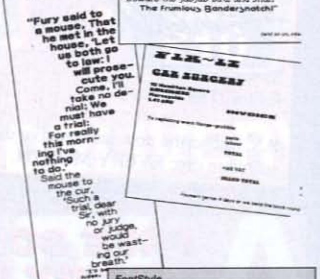
MEMO

Jabberwocky

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogoves,
And the mome raths outgrabe.

"Beware the Jabberwock, my son!
The jaws that bite, the claws that c
Beware the Jubjub bird, and shun
The frumious Bandersnatch!"

The mouse's tale

"Fury said to a mouse, That he met in the house, 'Let us both go to law: I will prosecute you. Come, I'll take no denial: We must have a trial: For really this morning I've nothing to do.' Said the mouse to the cur, 'Such a trial, dear Sir, with no jury or judge, would be wasting our breath.'

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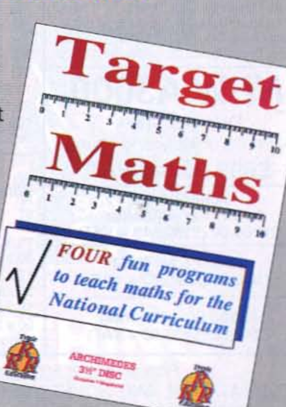
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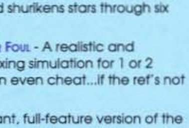

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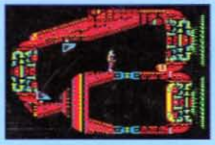

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